



Hardware Maintenance Manual



ThinkThink**ThinkServer**Think

ThinkServer RD220 Types 3797, 3798, 3779, and 3729

ThinkServer RD220 Types 3729, 3779, 3797, and 3798



Hardware Maintenance Manual

Note: Before using this information and the product it supports, read the general information in "Notices," on page 247 and the *Warranty and Support Information* document on the *ThinkServer Documentation* DVD.

Second Edition (November 2009)

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Chapter 1. About this manual

This *Hardware Maintenance Manual* contains information to help you solve problems that might occur in your server. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

The most recent version of this document is available at <http://www.lenovo.com/support>.

Before servicing a Lenovo product, be sure to read the Safety Information. See Chapter 2, "Safety information," on page 3.

Important Safety Information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Veuillez lire toutes les consignes de type DANGER et ATTENTION du présent document avant d'exécuter les instructions.

Lesen Sie unbedingt alle Hinweise vom Typ "ACHTUNG" oder "VORSICHT" in dieser Dokumentation, bevor Sie irgendwelche Vorgänge durchführen

Leggere le istruzioni introdotte da ATTENZIONE e PERICOLO presenti nel manuale prima di eseguire una qualsiasi delle istruzioni

Certifique-se de ler todas as instruções de cuidado e perigo neste manual antes de executar qualquer uma das instruções

Es importante que lea todas las declaraciones de precaución y de peligro de este manual antes de seguir las instrucciones.

تأكد من قراءة كل التحذيرات الموجودة في هذا الكتاب قبل اتباع هذه التعليمات .

执行任何说明之前，请确保已阅读本书中的所有警告和危险声明。

執行任何指示前，請確實閱讀本書中的所有警告及危險聲明。

ודאו שקראתם את כל הודעות האזהרה והסכנה במסמך זה לפני שתבצעו פעולה כלשהי.

본 사용 설명서에 기재된 내용을 실행하기 전에 모든 주의사항 및 위험사항을 숙지하십시오.

Important information about replacing RoHS compliant FRUs

RoHS, The Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (2002/95/EC) is a European Union legal requirement affecting the global electronics industry. RoHS requirements must be implemented on Lenovo products placed on the market and sold in the European Union after June 2006. Products on the market before June 2006

are not required to have RoHS compliant parts. If the parts are not compliant originally, replacement parts can also be noncompliant, but in all cases, if the parts are compliant, the replacement parts must also be compliant.

Note: RoHS and non-RoHS FRU part numbers with the same fit and function are identified with unique FRU part numbers.

Lenovo plans to transition to RoHS compliance well before the implementation date and expects its suppliers to be ready to support Lenovo's requirements and schedule in the EU. Products sold in 2005, will contain some RoHS compliant FRUs. The following statement pertains to these products and any product Lenovo produces containing RoHS compliant parts.

RoHS compliant ThinkCentre parts have unique FRU part numbers. Before or after June, 2006, failed RoHS compliant parts must always be replaced using RoHS compliant FRUs, so only the FRUs identified as compliant in the system HMM or direct substitutions for those FRUs can be used.

Products marketed before June 2006		Products marketed after June 2006	
Current or original part	Replacement FRU	Current or original part	Replacement FRU
Non-RoHS	Can be Non-RoHS	Must be RoHS	Must be RoHS
Non-RoHS	Can be RoHS		
Non-RoHS	Can sub to RoHS		
RoHS	Must be RoHS		

Note: A direct substitution is a part with a different FRU part number that is automatically shipped by the distribution center at the time of order.

Turkish statement of compliance

The Lenovo product meets the requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (EEE).

Türkiye EEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın "Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılmasına Dair Yönetmelik (EEE)" direktiflerine uygundur.

EEE Yönetmeliğine Uygundur.

Chapter 2. Safety information

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Guidelines for trained service technicians

This section contains information for trained service technicians.

Inspecting for unsafe conditions

Use the information in this section to help you identify potential unsafe conditions in a Lenovo product that you are working on. Each Lenovo product, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by non-Lenovo alterations or attachment of non-Lenovo features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that they present:

- Electrical hazards, especially primary power. Primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.
 - Make sure that the insulation is not frayed or worn.
4. Remove the cover.
5. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
6. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, power surges, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical currents.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.

- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.
- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
 - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
 - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
 - When you use a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when you measure high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Safety statements

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Attention: Use No. 26 AWG or larger UL-listed or CSA certified telecommunication line cord.

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2:



CAUTION:

When replacing the lithium battery, use only a type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

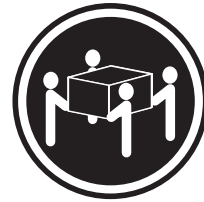
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

CAUTION:

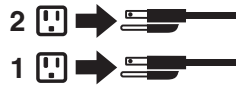
Use safe practices when lifting.

Statement 5:



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 26:



CAUTION:

Do not place any object on top of rack-mounted devices.



Attention: This server is suitable for use on an IT power distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

Important: This product is not suitable for use with visual display workplace devices according to Clause 2 of the German Ordinance for Work with Visual Display Units.

Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page 3, and the guidelines in this section. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps:
 1. Go to: <http://www.lenovo.com/support>.
 2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.

3. From **Family** list, select **ThinkServer**, and click **Continue**.
 4. Click **Downloads and drivers** to download firmware updates.
 5. Click **User's guides and manuals** for documentation.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, refer to the "Diagnosing a problem" on page 25 for diagnostic information.
 - Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
 - If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
 - Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
 - Make sure that you can stand safely without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
 - Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
 - Back up all important data before you make changes to disk drives.
 - Have a small flat-blade screwdriver available.
 - To view the error LEDs on the system board and internal components, leave the server connected to power.
 - You do not have to turn off the server to install or replace hot-swap fans, redundant hot-swap ac power supplies, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables or non-hot-swap optional devices or components.
 - Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
 - Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
 - When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
 - For a list of supported optional devices for the server, see <http://www.lenovo.com/thinkserver>.

System reliability guidelines

To help ensure proper system cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap fan within 30 seconds of removal.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessors to overheat.
- Microprocessor 2 air baffle and DIMM air baffle are installed.
- The EasyLED diagnostics panel is not pulled out of the server.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

The server supports hot-plug, hot-add, and hot-swap devices and is designed to operate safely while it is turned on and the cover is removed. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that could fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.

- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Chapter 3. General information

This chapter provides general information that applies to all machine types supported by this publication.

Introduction

The four types of replaceable components are:

- **Consumables:** Purchase and replacement of consumables (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If Lenovo acquires or installs a consumable component at your request, you will be charged for the service. For a list of consumable parts, see <http://www.lenovo.com/support>.
- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For a list of replaceable components for the server, go to:
<http://www.lenovo.com/support>

Features and technologies

The RD220 server offers the following features and technologies:

- **UEFI-compliant server firmware**

UEFI replaces the basic input/output system (BIOS) and defines a standard interface between the operating system, platform firmware, and external devices. UEFI-compliant servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: This server does not support DOS.

- **Integrated Management Module**

The Integrated Management Module (IMM) combines service processor functions, video controller, and (when IMM Premium is installed) remote presence function in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. IMM Premium provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) version 2.0
- Simple Network Management Protocol (SNMP) version 3
- Common Information Model (CIM)
- Web browser

- **Remote presence capability and blue-screen capture**

IMM Premium is required to enable the remote presence and blue-screen capture features. The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

- **IBM® Advanced Settings Utility (ASU) program**

Use this program as an alternative to the UEFI Setup Utility for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the server to access the UEFI Setup Utility program.

- **Preboot diagnostics programs**

The preboot diagnostics programs are stored on the integrated USB memory. It collects and analyzes system information to aid in diagnosing server problems. The diagnostics programs collect the following information about the server:

- System configuration
- Network interfaces and settings
- Installed hardware
- EasyLED diagnostics status
- Service processor status and configuration
- Vital product data, firmware, and UEFI (formerly BIOS) configuration
- Hard disk drive health
- RAID controller configuration
- Event logs for RAID controllers and service processors

The diagnostics programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to service and support. Additionally, you can view the information locally through a generated text report file. You can also copy the log to a removable media and view the log from a Web browser.

For additional information about preboot diagnostics programs, see the *Hardware Maintenance Manual*.

- **EasyStartup DVD**

The ThinkServer EasyStartup program guides you through the configuration of the hardware, the RAID controller, and the installation of the operating system and device drivers.

- **EasyManage DVD**

The EasyManage program helps you manage and administer your servers and clients through remote problem notification as well as monitoring and alerting.

- **Integrated network support**

The server comes with two integrated Broadcom Gigabit Ethernet controllers, which support connection to a 10-Mbps, 100-Mbps, or 1000-Mbps network.

- **Large data-storage and hot-swap capability**

The server supports up to eight or twelve 2.5-inch hot-swap hard disk drives in the hot-swap bays (depending on the model and optional devices installed). With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **EasyLED diagnostics**

EasyLED diagnostics provides LEDs to help you diagnose problems. For more information, see “EasyLED diagnostics panel” on page 46

- **Memory mirroring**

Memory mirroring improves the availability of memory by writing information to the main memory and redundant locations in a mirrored pair of DIMMs.

- **Large system-memory capacity**

The memory bus supports up to 128 GB of system memory. The memory controller supports error correcting code (ECC) for up to 16 industry-standard PC3-10600R-999 (single-rank or dual-rank), 800, 1067, and 1333 MHz, DDR3 (third-generation double-data-rate), registered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **PCI adapter capabilities**

The server supports up to four PCI interface slots. For more information, see “Installing a PCI adapter” on page 180.

- **Redundant connection**

The addition of the optional Ethernet daughter card provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection and the optional Ethernet daughter card is installed on the server, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet daughter card connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling and power capabilities**

The server supports three hot-swap fans, which provide redundant cooling. Redundant cooling enables continued operation if one of the fans fails. The server supports up to two 675-watt ac power supplies, which provide redundancy and hot-swap capability for a typical configuration. If the maximum load on the server is less than 675 watts and a problem occurs with one of the power supplies, the other power supply can meet the power requirements.

- **RAID support**

The server supports an internal RAID SAS Controller, which is required for you to use the hot-swap hard disk drives and to create redundant array of independent disks (RAID) configurations.

- **TCP/IP offload engine (TOE) support**

The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessors and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE.

Note: As of the date of this document, the Linux® operating system does not support TOE.

Specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1-U-high device is 1.75 inches tall.

Notes:

1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.
2. The sound levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Dual Core or Quad Core Intel® Xeon, with integrated memory controller and Quick Path Interconnect (QPI) architecture • Designed for XBGGA 1366 socket • Scalable up to four cores • 32 KB instruction cache, 32 KB data cache, and 8 MB cache that is shared among the cores • Support for up to two microprocessors • Support for Intel Extended Memory 64 Technology (EM64T) <p>Note:</p> <ul style="list-style-type: none"> • Use the Setup utility to determine the type and speed of the microprocessors. • For a list of supported microprocessors, see http://www.lenovo.com/thinkserver <p>Memory:</p> <ul style="list-style-type: none"> • Sixteen DIMM connectors (eight per microprocessor) • Minimum: 1 GB DIMM per microprocessor • Maximum: 96 GB • Type: Registered ECC double-data-rate 3 (DDR3) -800, -1066, and -1033 DIMMs only (PC3-10600R-999, PC3-8500R-777) • Sizes: <ul style="list-style-type: none"> – 1 GB single-rank, 2 GB single-rank or dual-rank, 4 GB dual-rank (PC3-10600R-999) – 8 GB quad-rank (PC3-8500R-777) <p>Drives:</p> <p>CD/DVD: SATA interface 24x CD-RW/ 8x DVD combination</p> <p>Expansion bays:</p> <p>Eight 2.5-inch SAS hot-swap hard disk drive bays with option to add 4 more 2.5-inch SAS hot-swap hard disk drive bays</p> <p>Expansion slots:</p> <ul style="list-style-type: none"> • Two PCI Express riser cards with two PCI Express x8 slots (x8 lanes) each, standard • Support for the following optional riser cards: <ul style="list-style-type: none"> – One PCI Express x16 slot (x16 lanes) 	<p>Hot-swap fans:</p> <p>Three. Provide redundant cooling.</p> <p>Hot-swap power supplies:</p> <p>675 watts (100 - 240 V ac)</p> <ul style="list-style-type: none"> • Minimum: One • Maximum: Two - provide redundant power <p>Size (2 U):</p> <ul style="list-style-type: none"> • Height: 85.2 mm (3.346 in.) • Depth: EIA flange to rear - 698 mm (27.480 in.), Overall - 729 mm (28.701 in.) • Width: With top cover - 443.6 mm (17.465 in.), With front bezel - 482.0 mm (18.976 in.) • Weight: approximately 21.09 kg (46.5 lb) to 29.03 kg (64 lb) depending upon configuration <p>Integrated functions:</p> <ul style="list-style-type: none"> • Integrated Management Module (IMM), which provides service processor control and monitoring functions, video controller, and (when the optional virtual media key is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities • Dedicated or shared management network connections • Six-port Serial ATA (SATA) controller • Serial over LAN (SOL) and serial redirection over Telnet or Secure Shell (SSH) • One systems-management RJ-45 for connection to a dedicated systems-management network • Support for remote management presence through an optional virtual media key • One Broadcom dual-port 10/100/1000 Ethernet controller with TCP/IP Offload Engine (TOE) support (second identical Ethernet controller on an optional internal adapter card) • One serial port, shared with the Integrated Management Module (IMM) • Four Universal Serial Bus (USB) ports (two on front, two on rear of server), v2.0 supporting v1.1, plus one or more dedicated internal USB ports on the SAS riser card • Two video ports (one on front and one on rear of server) <p>Note: Maximum video resolution 1600 x 1200 at 60Hz</p> <ul style="list-style-type: none"> • One SATA tape connector, one USB tape connector, and one tape power connector on SAS riser card (some models) <p>Note: In messages and documentation, the term <i>service processor</i> refers to the Integrated Management Module (IMM)</p>	<p>Video controller:</p> <ul style="list-style-type: none"> • Matrox G200 video on system board • Compatible with SVGA and VGA • 8 MB DDR2 SDRAM video memory <p>RAID controller:</p> <ul style="list-style-type: none"> • ServeRAID™-BR10i SAS/SATA Controller that supports RAID levels 0, 1, 1E (standard) • Upgradeable to ServeRAID-MR10i SAS/SATA Controller, which supports RAID levels 0, 1, 5, 6, 10, 50, 60 <p>Note: The RAID controllers are installed in a PCI Express x8 mechanical slot (x4 electrical); however, the controllers run at x4 bandwidth.</p> <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 3050 m (10006 ft). Decrease system temperature by 0.75°C for every 1000-foot increase in altitude. – Server off: 5° to 45°C (41.0° to 113.0°F); maximum altitude: 3050 m (10006 ft) – Shipment: -40° to +60°C (-40° to 140°F); maximum altitude: 2133 m (7000 ft) • Humidity: <ul style="list-style-type: none"> – Server on: 20% to 80% – Server off: 8% to 80% – Shipment: 5% to 100% <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Declared sound power, idle: 6.3 bel • Declared sound power, operating: 6.5 bel <p>Heat output:</p> <p>Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> • Minimum configuration: 307 Btu per hour (194 watts) • Maximum configuration: 2662 Btu per hour (675 watts) <p>Electrical input with hot-swap ac power supplies:</p> <ul style="list-style-type: none"> • Sine-wave input (50-60 Hz) required • Input voltage range automatically selected • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 240 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA) approximately: <ul style="list-style-type: none"> – Minimum: 0.12 kVA – Maximum: 0.78 kVA
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Software

Lenovo provides software to help get your server up and running.

EasyStartup

The ThinkServer EasyStartup program simplifies the process of your RAID controller and installing supported Windows® and Linux operating systems and device drivers on your server. The EasyStartup program is provided with your server on DVD. The DVD is self starting (bootable). The User Guide for the EasyStartup program is on the DVD and can be accessed directly from the program's interface.

EasyManage

The ThinkServer EasyManage Core Server provides centralized hardware and software inventory management and secure automated system management through a centralized console. The ThinkServer EasyManage Agent enables other clients on the network to be managed by the centralized console. The ThinkServer EasyManage Core Server is supported on 32-bit Windows Server 2003 and 32-bit Windows Server 2008 products. The ThinkServer EasyManage Agent is supported on 32-bit and 64-bit Windows, Red Hat, and SUSE operating systems.

Chapter 4. General Checkout

You can solve many problems without outside assistance by following the troubleshooting procedures in this *Hardware Maintenance Manual* and on the Lenovo Web site. This document describes the diagnostic tests that you can perform, troubleshooting procedures, and explanations of error messages and error codes. The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a problem

Before you contact Lenovo or an approved warranty service provider, follow these procedures in the order in which they are presented to diagnose a problem with your server:

1. **Determine what has changed.**

Determine whether any of the following items were added, removed, replaced, or updated before the problem occurred:

- UEFI
- Device drivers
- Firmware
- Hardware components
- Software

If possible, return the server to the condition it was in before the problem occurred.

2. **Collect data.**

Thorough data collection is necessary for diagnosing hardware and software problems.

a. **Document error codes and system-board LEDs.**

- **System error codes:** See the *Installation and User Guide* for information about a specific error code.
- See the *Installation and User Guide* for the location of the system-board LEDs.
- **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's Web site for documentation.
- **Light path diagnostics LEDs:** See the *Installation and User Guide* for information about LEDs that are lit.

b. **Collect system data.**

Run Dynamic System Analysis (DSA) Preboot diagnostics program to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact Lenovo or an approved warranty service provider. See <http://www.lenovo.com/support> for the instructions to run the DSA Preboot program.

If you need to download the latest version of DSA Preboot, go to <http://www.lenovo.com/support> or complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- 1) Go to: <http://www.lenovo.com/support>.

- 2) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- 3) From **Family** list, select **ThinkServer**, and click **Continue**.
- 4) Click **Downloads and drivers** to download firmware updates.

For information about DSA command-line options, go to:
<http://www.lenovo.com/support>

3. Follow the problem-resolution procedures.

The four problem-resolution procedures are presented in the order in which they are most likely to solve your problem. Follow these procedures in the order in which they are presented:

a. Check for and apply code updates.

Most problems that appear to be caused by faulty hardware are actually caused by the UEFI firmware (formerly BIOS firmware), device firmware, or device drivers that are not at the latest levels.

1) Determine the existing code levels.

In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

2) Download and install updates of code that is not at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To display a list of available updates for your server, go to
<http://www.lenovo.com/thinkserver> or complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- a) Go to: <http://www.lenovo.com/support>.
- b) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- c) From **Family** list, select **ThinkServer**, and click **Continue**.
- d) Click **Downloads and drivers** to download firmware updates.

When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

b. Check for and correct an incorrect configuration.

If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.

1) Make sure that all installed hardware and software are supported.

See <http://www.lenovo.com/support> to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact Lenovo or an approved warranty service provider for support.

2) Make sure that the server, operating system, and software are installed and configured correctly.

Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on. See the *Installation and User Guide* for the instructions to perform the checkout procedures.

If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems or Lenovo software or devices, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- a) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- b) From **Family** list, select **ThinkServer**, and click **Continue**.
- c) Click **Downloads and drivers** to download firmware updates.
- d) Click **User's guides and manuals** for documentation.

c. **Lenovo Hints and Tips document known problems and suggested solutions.**

To search for hints and tips, complete the following steps (the actual procedure might vary slightly from what is described in this document):

Note: Changes are made periodically to the Lenovo Web site.

- 1) Go to <http://www.lenovo.com/support>.
- 2) Select **Servers and Storage** from the **Product** list.
- 3) From the **Family** list, select **ThinkServer RD210** and click **Continue**.
- 4) Click on **Hints and Tips**.

d. **Check for and replace defective hardware.**

If a hardware component is not operating within specifications, it can cause unpredictable results. Most hardware failures are reported as error codes in a system or operating-system log. Hardware errors are also indicated by light path diagnostics LEDs. See the *Installation and User Guide* for more information.

Troubleshooting procedures are also provided on the Lenovo Web site. A single problem might cause multiple symptoms. Follow the diagnostic procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible. To locate troubleshooting procedures for your server, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- 1) Go to: <http://www.lenovo.com/support>.
- 2) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.

3) From **Family** list, select **ThinkServer**, and click **Continue**.

4) Click on **Troubleshooting**.

For more troubleshooting information, see the *Installation and User Guide*.

If the problem remains, contact Lenovo or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. To open an online service request, go to <http://www.lenovo.com/support>. Be prepared to provide information about any error codes and collected data.

Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by Lenovo. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact Lenovo or an approved warranty service provider for assistance. To open an online service request, go to <http://www.lenovo.com/support>. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 5. Diagnostics

Diagnosing a problem

Before you contact Lenovo or an approved warranty service provider, follow these procedures in the order in which they are presented to diagnose a problem with your server:

1. **Determine what has changed.**

Determine whether any of the following items were added, removed, replaced, or updated before the problem occurred:

- UEFI
- Device drivers
- Firmware
- Hardware components
- Software

If possible, return the server to the condition it was in before the problem occurred.

2. **Collect data.**

Thorough data collection is necessary for diagnosing hardware and software problems.

a. **Document error codes and system-board LEDs.**

- **System error codes:** See the *Installation and User Guide* for information about a specific error code.
- See the *Installation and User Guide* for the location of the system-board LEDs.
- **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's Web site for documentation.
- **Light path diagnostics LEDs:** See the *Installation and User Guide* for information about LEDs that are lit.

b. **Collect system data.**

Run Dynamic System Analysis (DSA) Preboot diagnostics program to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact Lenovo or an approved warranty service provider. See <http://www.lenovo.com/support> for the instructions to run the DSA Preboot program.

If you need to download the latest version of DSA Preboot, go to <http://www.lenovo.com/support> or complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- 1) Go to: <http://www.lenovo.com/support>.
- 2) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- 3) From **Family** list, select **ThinkServer**, and click **Continue**.
- 4) Click **Downloads and drivers** to download firmware updates.

For information about DSA command-line options, go to:
<http://www.lenovo.com/support>

3. Follow the problem-resolution procedures.

The four problem-resolution procedures are presented in the order in which they are most likely to solve your problem. Follow these procedures in the order in which they are presented:

a. Check for and apply code updates.

Most problems that appear to be caused by faulty hardware are actually caused by the UEFI firmware (formerly BIOS firmware), device firmware, or device drivers that are not at the latest levels.

1) Determine the existing code levels.

In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

2) Download and install updates of code that is not at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To display a list of available updates for your server, go to <http://www.lenovo.com/thinkserver> or complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- a) Go to: <http://www.lenovo.com/support>.
- b) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- c) From **Family** list, select **ThinkServer**, and click **Continue**.
- d) Click **Downloads and drivers** to download firmware updates.

When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

b. Check for and correct an incorrect configuration.

If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.

1) Make sure that all installed hardware and software are supported.

See <http://www.lenovo.com/support> to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact Lenovo or an approved warranty service provider for support.

2) Make sure that the server, operating system, and software are installed and configured correctly.

Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on. See the *Installation and User Guide* for the instructions to perform the checkout procedures.

If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the

documentation for the associated controller and management or controlling software to verify that the controller is correctly configured. Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems or Lenovo software or devices, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- a) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- b) From **Family** list, select **ThinkServer**, and click **Continue**.
- c) Click **Downloads and drivers** to download firmware updates.
- d) Click **User's guides and manuals** for documentation.

c. **Lenovo Hints and Tips document known problems and suggested solutions.**

To search for hints and tips, complete the following steps (the actual procedure might vary slightly from what is described in this document):

Note: Changes are made periodically to the Lenovo Web site.

- 1) Go to <http://www.lenovo.com/support>.
- 2) Select **Servers and Storage** from the **Product** list.
- 3) From the **Family** list, select **ThinkServer RD210** and click **Continue**.
- 4) Click on **Hints and Tips**.

d. **Check for and replace defective hardware.**

If a hardware component is not operating within specifications, it can cause unpredictable results. Most hardware failures are reported as error codes in a system or operating-system log. Hardware errors are also indicated by light path diagnostics LEDs. See the *Installation and User Guide* for more information.

Troubleshooting procedures are also provided on the Lenovo Web site. A single problem might cause multiple symptoms. Follow the diagnostic procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible. To locate troubleshooting procedures for your server, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

- 1) Go to: <http://www.lenovo.com/support>.
- 2) Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
- 3) From **Family** list, select **ThinkServer**, and click **Continue**.
- 4) Click on **Troubleshooting**.

For more troubleshooting information, see the *Installation and User Guide*.

If the problem remains, contact Lenovo or an approved warranty service provider for assistance with additional problem determination and possible

hardware replacement. To open an online service request, go to <http://www.lenovo.com/support>. Be prepared to provide information about any error codes and collected data.

Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by Lenovo. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact Lenovo or an approved warranty service provider for assistance. To open an online service request, go to <http://www.lenovo.com/support>. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:

- **Troubleshooting tables**

These tables list problem symptoms and actions to correct the problems.

- **Light path diagnostics**

Use the light path diagnostics to diagnose system errors quickly.

- **Preboot Dynamic System Analysis (DSA) diagnostic programs**

The Preboot DSA diagnostic programs provide problem isolation, configuration analysis, and error log collection. The diagnostic programs are the primary method of testing the major components of the server and are stored in integrated USB memory. The diagnostic programs collect the following information about the server:

- System configuration
- Network interfaces and settings
- Installed hardware
- Light path diagnostics status
- Service processor status and configuration
- Vital product data, firmware, and UEFI configuration
- Hard disk drive health
- RAID controller configuration
- ServeRAID controller and service processor event logs, including:
 - System error logs
 - Temperature, voltage, and fan speed information
 - Tape drive presence and read/write test results
 - Systems management analysis and reporting technology (SMART) data
 - USB information
 - monitor configuration information
 - PCI slot information

The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to the Lenovo Support Center. Additionally, you can view the server information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser. See “Running the diagnostic programs” on page 54 for more information.

- **Checkpoint codes**

Checkpoint codes track the progress of POST routines at system startup or reset. Checkpoint codes are shown on the checkpoint display, which is on the light path diagnostics panel. See “Checkpoint codes” on page 41 for more information.

POST

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

If a power-on password is set, you must type the password and press Enter, when prompted, for POST to run.

Error logs

The POST error log contains the three most recent error codes and messages that were generated during POST. The RMM system event log contains monitored events, such as a threshold that is reached or a device that fails. The system event/error log contains messages that were generated during POST and all system status messages from the service processor.

The following illustration shows an example of a RMM system event log entry.

```
RMM System Event Log
-----
Get Next Entry
Get Previous Entry
Clear BMC SEL

Entry Number=    00005 / 00011
Record ID=       0005
Record Type=     02
Timestamp=       2005/01/25  16:15:17
Entry Details:   Generator ID= 0020
                  Sensor Type= 04
                  Assertion Event
                  Fan
                  Threshold
                  Lower Non-critical - going high

                  Sensor Number= 40
                  Event Direction/Type= 01

                  Event Data= 52 00 1A
```

The RMM system event log is limited in size. When the log is full, new entries will not overwrite existing entries; therefore, you must periodically clear the RMM system event log through the Server Configuration and Boot Management program. When you are troubleshooting an error, be sure to clear the RMM system event log so that you can find current errors more easily.

Entries that are written to the RMM system event log during the early phase of POST show an incorrect date and time as the default time stamp; however, the date and time are corrected as POST continues.

Each system event/error log entry appears on its own page. To move from one entry to the next, use the up-arrow and down-arrow keys.

If you view the RMM system event log through the Web interface of the optional virtual media key, the messages can be translated.

You can view the contents of the POST error log, the RMM system event log, and the system event/error log from the Server Configuration and Boot Management program. You can view the contents of the RMM system event log also from the diagnostic programs.

When you are troubleshooting PCI slots, note that the error logs report the PCI buses numerically. The numerical assignments vary depending on the configuration. You can check the assignments by running the Server Configuration and Boot Management program (see the *Installation and Users Guide* for more information).

Viewing error logs from the Server Configuration and Boot Management program

For complete information about using the Server Configuration and Boot Management program, see the *Installation and User's Guide*.

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt Press F1 to enter Setup appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the error logs.
3. Use one of the following procedures:
 - To view the POST error log, select **Event/Error Logs**, and then select **POST Error Log**.
 - To view the BMC system event log, select **Advanced Setup --> Baseboard Management Controller (BMC) Setting --> System Event Log**.
 - To view the combined system event/error log and POST error log, select **Event/Error logs**, and then select **System Event/Error Log**.

Viewing the RMM system event log from the diagnostic programs

The RMM system event log contains the same information, whether it is viewed from the Server Configuration and Boot Management program or from the diagnostic programs.

For information about using the diagnostic programs, see "Running the diagnostic programs" on page 54.

To view the RMM system event log, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt F2 for Diagnostics appears, press F2. If you have set both a power-on password and an administrator password, you must type the administrator password to run the diagnostic programs.
4. From the top of the screen, select **Hardware Info**.
5. From the list, select **RMM Log**.

Clearing the error logs

For complete information about using the Server Configuration and Boot Management program, see the *Installation and User's Guide*.

To clear the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt Press F1 to enter Setup appears, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the error logs.
3. Use one of the following procedures:
 - To clear the RMM system event log, select **Advanced Setup --> Baseboard Management Controller (BMC) Setting--> BMC System Event Log**. Select **Clear BMC SEL**.
 - To clear the system event/error log, if one is present, or the POST error log, select **Event/Error Logs**, and then select **Post Error Log** or **System**

Event/Error Log. When any log entry is displayed, press Enter (**Clear xxxx log** is highlighted on each entry page, where xxxx is the name of the log that you are viewing).

Note: The POST error log is automatically cleared with each system restart.

POST error codes

The following table describes the POST error codes and suggested actions to correct the detected problems.

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	<ol style="list-style-type: none"> Run the Server Configuration and Boot Management program, save the configuration, and restart the server. Update the system firmware to the latest level. (see the information in <i>Installation and User Guide</i>). Reseat the following components, one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> Battery (Trained service technician only) Microprocessor Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> Battery (Trained service technician only) Microprocessor (Trained service technician only) System board
101, 102	System and processor error.	(Trained service technician only) Replace the system board.
106	System and processor error.	(Trained service technician only) Replace the system board.
151	Real-time clock error.	<ol style="list-style-type: none"> Reseat the battery. Clear CMOS memory. See “System-board switches and jumpers” on page 152 for information about how to clear CMOS memory. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> Battery (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
161	Real-time clock battery error.	<ol style="list-style-type: none"> 1. Reseat the battery. 2. Clear CMOS memory. See “System-board switches and jumpers” on page 152 for information about how to clear CMOS memory. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board
162	Device configuration error.	<ol style="list-style-type: none"> 1. Run the Server Configuration and Boot Management program, select Load Default Settings, and save the settings. 2. Reseat the following components, one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. Failing device (if the device is a FRU, then it must be reseated by a trained service technician only) 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. Failing device (if the device is a FRU, then it must be replaced by a trained service technician only) c. (Trained service technician only) System board
163	Real-time clock error. (time of day not set)	<ol style="list-style-type: none"> 1. Run the Server Configuration and Boot Management program, select Load Default Settings, make sure that the date and time are correct, and save the settings. 2. Reseat the battery. 3. Clear CMOS memory. See “System-board switches and jumpers” on page 152 for information about how to clear CMOS memory. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
184	Power-on password damaged.	<ol style="list-style-type: none"> 1. Restart the server and enter the administrator password; then, run the Server Configuration and Boot Management program, select Load Default Settings, and save the settings. 2. Reseat the battery. 3. Clear CMOS memory. See “System-board switches and jumpers” on page 152 for information about how to clear CMOS memory. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board
187	VPD serial number not set.	<ol style="list-style-type: none"> 1. Run the Server Configuration and Boot Management program, set the serial number, and save the configuration. 2. (Trained service technician only) Replace the system board.
189	An attempt was made to access the server with an incorrect password.	Restart the server and enter the administrator password; then, run the Server Configuration and Boot Management program and change the power-on password.
289	A DIMM has been disabled by the user or by the system.	<ol style="list-style-type: none"> 1. If the DIMM was disabled by the user, run the Server Configuration and Boot Management program and enable the DIMM. 2. Make sure that the DIMM is installed correctly (see “Installing a DIMM” on page 192). 3. Reseat the DIMM. 4. Replace the DIMM.
301	Keyboard or keyboard controller error.	<ol style="list-style-type: none"> 1. Reseat the keyboard cable in the USB connector. 2. Move the keyboard cable to a different USB connector. 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Keyboard b. (Only if the problem occurred with a front USB connector) Internal USB cable. c. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
303	Keyboard controller error.	<ol style="list-style-type: none"> 1. Reseat the keyboard cable in the USB connector. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Keyboard b. (Trained service technician only) System board
1600	Service processor not functioning.	<ol style="list-style-type: none"> 1. (Trained service technician only) Replace the system board.
178x	Fixed disk error. Note: x is the drive that has the error	<ol style="list-style-type: none"> 1. Run the hard disk drive diagnostics tests on drive x. 2. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. Cable from the system board to the backplane 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Hard disk drive b. Cable from the system board to the backplane c. Hard disk drive backplane d. (Trained service technician only) System board
1800	Unavailable PCI hardware interrupt.	<ol style="list-style-type: none"> 1. Run the Server Configuration and Boot Management program and adjust the adapter settings. 2. Remove each adapter one at a time, restarting the server each time, until the problem is isolated.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
1801	An adapter has requested memory resources that are not available Note: The server can allocate only 128 KB of optional-device load space (option ROM space); error code 1801 occurs if the load space required by an optional-device ROM when loading exceeds the available (remaining) load space. Changing the optional-device load order can cause an optional-device ROM that requires more load space to load sooner, when more load space is available; the other optional-device ROMs might still fit in the remaining load space. With some optional devices, some or all of the load space used is released after the ROM code loads and initializes the optional device.	<ol style="list-style-type: none"> 1. If possible, rearrange the order of the adapters in the PCI slots, to change the load order of the optional-device ROM code. 2. Server Configuration and Boot Management program, select Startup Options, and change the boot sequence, to change the load order of the optional-device ROM code. 3. Run the Server Configuration and Boot Management program and disable some other resources, if their functions are not being used, to make more space available. <ul style="list-style-type: none"> • Select Startup Options then Planar Ethernet (PXE/DHCP) to disable the onboard Ethernet controller ROM. • Select Advanced Functions, then PCI Bus Control, then PCI ROM Control Execution to disable the ROM of adapters in the PCI slots. • Select Devices and I/O Ports to disable any of the onboard devices. 4. If the problem remains, replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Each adapter b. (Trained service technician only) System board
1805	PCI option ROM checksum error.	<ol style="list-style-type: none"> 1. Remove the failing adapter. 2. Reseat each adapter (all PCI slots). 3. Reseat the riser card. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Each adapter b. Riser card c. (Trained service technician only) System board
1810	PCI error.	<ol style="list-style-type: none"> 1. Reseat all adapters. 2. Reseat the riser card. 3. Remove both adapters from the riser card. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Riser card b. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
1962	A hard disk drive does not contain a valid boot sector.	<ol style="list-style-type: none"> 1. Make sure that a startable operating system is installed. 2. Run the hard disk drive diagnostic tests. 3. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive backplane cable 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Cable from hard disk drive backplane to system board b. Hard disk drive c. Hard disk drive backplane d. (Trained service technician only) System board
8603	Pointing-device error.	<ol style="list-style-type: none"> 1. Reseat the pointing device. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Pointing device b. (Trained service technician only) System board
00012000	Processor machine check error.	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat the microprocessor. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
00019701	Processor 1 failed BIST.	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat the microprocessor. 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) Microprocessor b. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Error code	Description	Action
01298001	No update data for processor 1.	<ol style="list-style-type: none"> 1. Update the UEFI code again. 2. (Trained service technician only) Replace the microprocessor.
01298101	Bad update data for processor 1.	<ol style="list-style-type: none"> 1. Update the UEFI code again. 2. (Trained service technician only) Replace the microprocessor.
I9990301	Hard disk drive boot sector error.	<ol style="list-style-type: none"> 1. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. Hard disk drive backplane cable 2. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Hard disk drive backplane cable b. Hard disk drive c. Hard disk drive backplane d. (Trained service technician only) System board
I9990305	Operating system not found.	Run the Server Configuration and Boot Management program to make sure that a bootable operating system is installed on one or more devices that are listed in the boot order.
I9990650	Power has been restored.	<ol style="list-style-type: none"> 1. Check the power cables. 2. Check for interruption of the power supply.

Checkout procedure

The checkout procedure is the sequence of tasks that you should follow to diagnose a problem in the server.

About the checkout procedure

Before performing the checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information that begins on page 3.
- The diagnostic programs provide the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.
- When you run the diagnostic programs, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

Exception: If there are multiple error codes or LEDs that indicate a microprocessor error, the error might be in the microprocessor or in the microprocessor socket. See “Solving Microprocessor problems” on page 144 for information about diagnosing microprocessor problems.

- Before running the diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:
 - You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).
 - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.
 - One or more servers are located near the failing server.

Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as “quick” or “normal” tests, because this might enable the hard disk drive diagnostic tests.

- If the server is halted and a POST error code is displayed, see “Error logs” on page 30.
- For information about power-supply problems, see “Solving power problems” on page 143.
- For intermittent problems, check the error log; see “Error logs” on page 30 and “Diagnostic programs, messages, and error codes” on page 54.

Performing the checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the server part of a cluster?
 - **No:** Go to step 2.
 - **Yes:** Shut down all failing servers that are related to the cluster. Go to step 2.
2. Complete the following steps:
 - a. Check the power supply LEDs, see “Power-supply LEDs” on page 50.
 - b. Turn off the server and all external devices.
 - c. Check all internal and external devices for compatibility at <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.
 - d. Make sure the server is cabled correctly.
 - e. Check all cables and power cords.
 - f. Set all display controls to the middle positions.
 - g. Turn on all external devices.
 - h. Turn on the server.
 - i. Check the system-error LED on the operator information panel. If it is flashing, check the light path diagnostics LEDs.
 - j. Check for the following results:
 - Successful completion of POST (see “POST” on page 29 for more information).
 - Successful completion of startup, which is indicated by a readable display of the operating-system desktop.

Checkpoint codes

A checkpoint code is a value produced by the UEFI indicating the point at which the system stopped during startup and Power-On Self Test (POST); it does not provide error codes or suggest replacement components. These codes may be used for more in-depth troubleshooting by Lenovo support.

Checkpoint codes are shown on the checkpoint code display on the light path diagnostics panel (see “Light path diagnostics LEDs” on page 44 for the location of the display area). By using the checkpoint display, you do not have to wait for the video to initialize each time you restart the server.

The following table describes the microprocessor checkpoint codes.

Table 2. Microprocessor Checkpoint Codes

Diagnostic Code	Description
0010001	Microprocessor disabled
0010002	Microprocessor not supported
0010004	Microprocessor invalid
0011000	Invalid microprocessor type
0011002	Microprocessor mismatch
0011004	Microprocessor failed BIST
001100A	Microcode update failed

There are two types of checkpoint codes: field programmable gate array (FPGA) hardware checkpoint codes and UEFI checkpoint codes. The UEFI checkpoint codes might change because of code sequence and timing changes or when the UEFI code is updated. See <http://www.lenovo.com/supportforcheckpointcodeinformation>.

Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error.

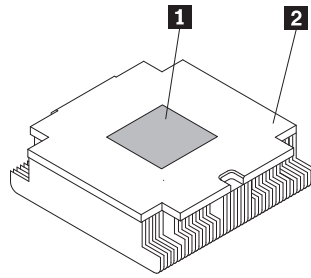
When LEDs are lit to indicate an error, they remain lit when the server is turned off, provided that the server is still connected to power and the power supply is operating correctly.

Before working inside the server to view light path diagnostics LEDs, read the safety information that begins on page 3.

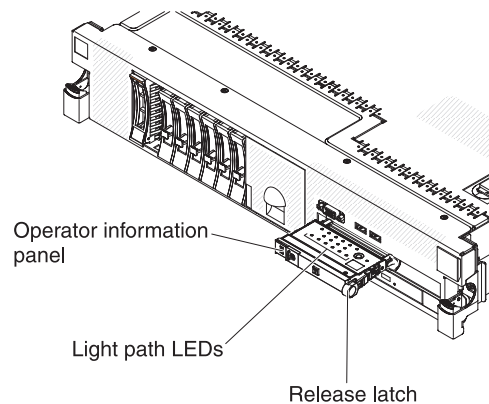
If an error occurs, view the light path diagnostics LEDs in the following order:

1. Look at the operator information panel on the front of the server.
 - If the information LED is lit, it indicates that information about a suboptimal condition in the server is available in the RMM system event log or in the system event/error log.
 - If the system-error LED is lit, it indicates that an error has occurred; go to step 2 on page 42.

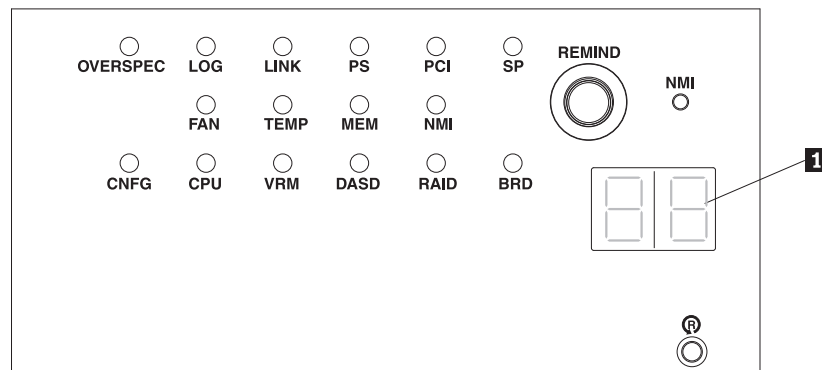
The following illustration shows the operator information panel.



2. To view the light path diagnostics panel, slide the latch to the left on the front of the operator information panel and pull the panel forward. This reveals the light path diagnostics panel. Lit LEDs on this panel indicate the type of error that has occurred.



The following illustration shows the light path diagnostics panel.

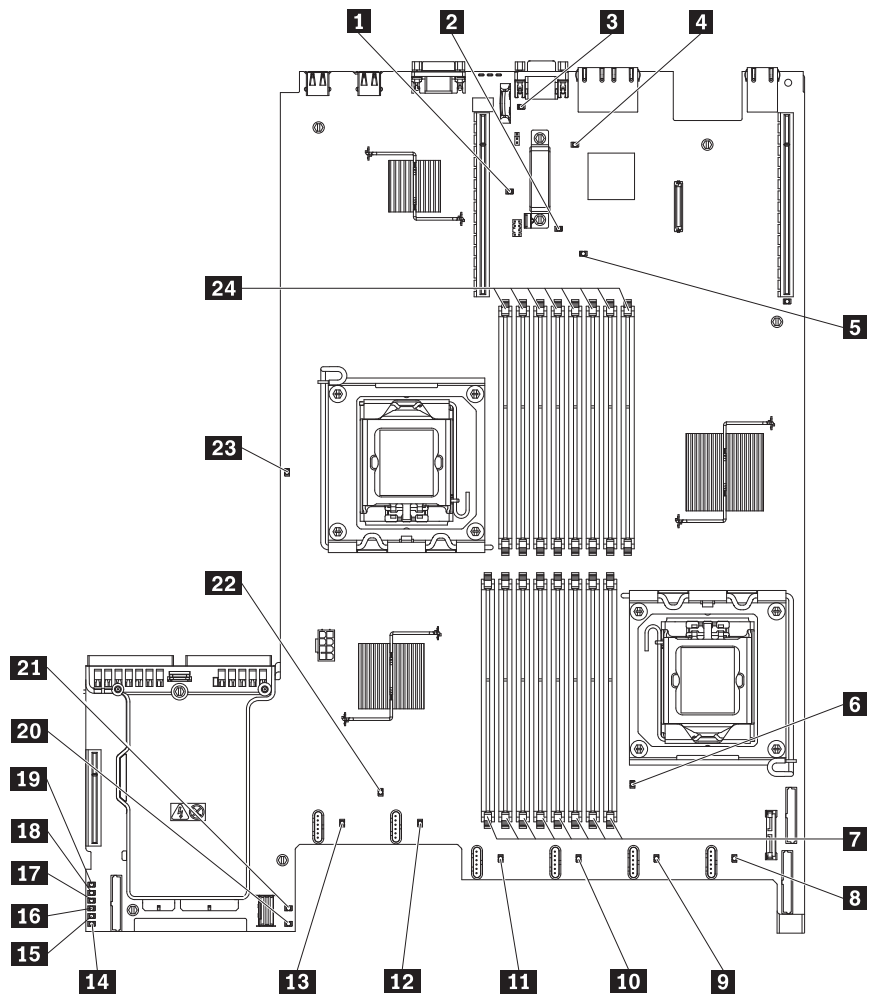


Note any LEDs that are lit, and then push the light path diagnostics panel back into the server.

Look at the system service label on the top of the server, which gives an overview of internal components that correspond to the LEDs on the light path diagnostics panel. This information and the information in “Light path diagnostics LEDs” on page 44 can often provide enough information to diagnose the error.

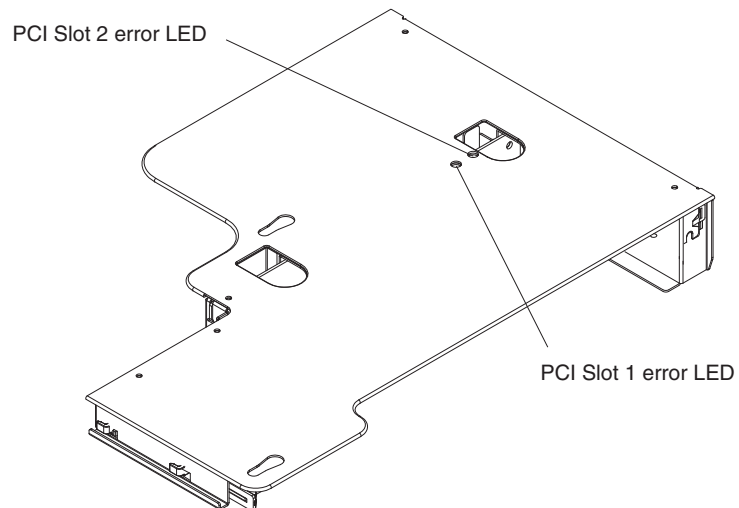
3. Remove the server cover and look inside the server for lit LEDs. A lit LED on or beside a component identifies the component that is causing the error.

The following illustration shows the LEDs on the system board.



12v channel error LEDs indicate an overcurrent condition. Table 4 on page 143 identifies the components associated with each power channel, and the order in which to troubleshoot the components.

The following illustration shows the LEDs on the riser card.



Remind button

You can use the remind button on the light path diagnostics panel to put the system-error LED on the operator information panel into Remind mode. When you press the remind button, you acknowledge the error but indicate that you will not take immediate action. The system-error LED flashes while it is in Remind mode and stays in Remind mode until one of the following conditions occurs:

- All known errors are corrected.
- The server is restarted.
- A new error occurs, causing the system-error LED to be lit again.

Light path diagnostics LEDs

The following table describes the LEDs on the light path diagnostics panel and suggested actions to correct the detected problems.

Note: Check the system event/error log and BMC system event log for additional information before replacing a FRU.

LED	Problem	Action
None, but the System Error LED is lit.	An error has occurred and cannot be diagnosed, or the RMM has failed. The error is not represented by a light path diagnostics LED.	Use the Server Configuration and Boot Management program to check the system error log for information about the error.
OVER SPEC	The server was shut down due to a power supply overload condition on one of the power channels. The power supplies are using more power than their maximum rating.	<ol style="list-style-type: none">1. If any of the 12v power channel error LEDs (A, B, C, D, E, or 240v AUX) on the system board are lit also, see the entries about power-channel error LEDs in “Solving power problems” on page 143. (See “Power-supply LEDs” on page 50 for the location of the power channel error LEDs.)2. Check the power supply LEDs for an error indication (AC LED and DC LED are not both lit, or the information LED is lit). Replace a failing power supply.3. Remove optional devices from the server.
LOG	An error message has been written to the system log	See the system log for details about the error.
LINK	Reserved.	
PS	A power supply has failed.	<ol style="list-style-type: none">1. Check the power supply LEDs for an error indication (AC LED and DC LED are not both lit).2. Make sure that the failing power supply is correctly seated.3. Replace the failed power supply.
PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	<ol style="list-style-type: none">1. Check the LEDs on the PCI slots to identify the component that is causing the error.2. Check the system-error log for information about the error.3. If you cannot isolate the failing adapter through the LEDs and the information in the system-error log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed.4. Call for service.
SP	The service processor (the RMM) has failed.	<ol style="list-style-type: none">1. Remove power from the server; then, reconnect the server to power and restart the server.2. Update the firmware on the RMM.3. Call for service

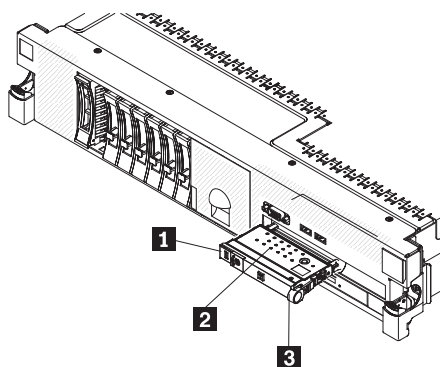
LED	Problem	Action
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	Replace the failing fan, which is indicated by a lit LED near the fan connector on the system board. Note: If an LED that is next to an <i>unused</i> fan connector on the system board is lit, a PCI riser-card assembly might be missing: replace the PCI riser-card assembly. Both PCI riser-card assemblies must always be present.
TEMP	The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	<ol style="list-style-type: none"> 1. Check the error log to identify where the over-temperature condition was measured. If a fan has failed, replace it. 2. Make sure that the room temperature is not too high. See “Features and technologies” on page 15 for temperature information. 3. Make sure that the air vents are not blocked. 4. Call for service.
MEM	A memory error has occurred.	Replace the failing DIMM, which is indicated by the lit LED on the system board.
NMI	A non-maskable interrupt has occurred, or the NMI button has been pressed.	Check the system-error log for information about the error.
CNFG	A hardware configuration error has occurred.	<ol style="list-style-type: none"> 1. Check the microprocessors that were just installed to make sure that they are compatible with each other (see the <i>Installation and User Guide</i>). 2. (Trained service technician only) Replace an incompatible microprocessor. 3. Check the system-error logs for information about the error. Replace any components that are indicated.
CPU	A microprocessor has failed.	<ol style="list-style-type: none"> 1. Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. See “Installing a microprocessor and heat sink” on page 218 for information about installing a microprocessor. 2. Make sure that the ServeRAID SAS controller is installed and correctly seated. Make sure that the battery for the ServeRAID SAS controller is installed correctly. 3. Call for service.
VRM	Reserved.	
DASD	A hard disk drive error has occurred. A hard disk drive has failed or is missing.	<ol style="list-style-type: none"> 1. Check the LEDs on the hard disk drives and replace the indicated drive. 2. Reseat the hard disk drive backplane cables. 3. Remove and reinstall the hard disk drive backplanes. 4. Call for service.
RAID	A RAID controller error has occurred.	<ol style="list-style-type: none"> 1. Make sure that a RAID controller is installed. Note: The server will not start without a RAID controller installed. 2. Check the system-error log for information about the error. 3. Reseat the RAID controller.

LED	Problem	Action
BRD	An error has occurred on the system board.	<ol style="list-style-type: none"> 1. Check the LEDs on the system board to identify the component that is causing the error. The BRD LED can be lit for the following conditions: <ul style="list-style-type: none"> • Battery • Missing PCI riser-card assembly • Failed voltage regulator 2. Check the system-error log for information about the error. 3. Replace any failed or missing replaceable components, such as the battery or PCI riser-card assembly. 4. If a voltage regulator has failed, replace the system board.

EasyLED diagnostics panel

The EasyLED diagnostics panel is located on the top of the operator information panel.

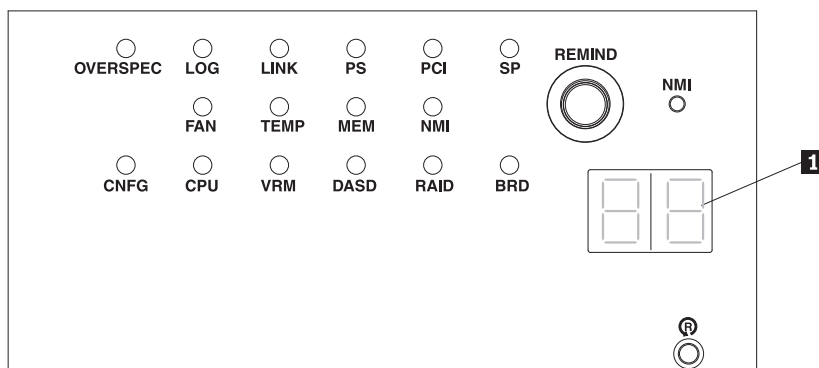
To access the diagnostics panel, slide the blue release button on the operator information panel to the left. Pull forward on the operator panel until the hinge of the panel is free of the server chassis. Then pull down on the operator panel, so that you can view the diagnostics panel information.



- 1** Operator information panel
- 2** Diagnostic LEDs
- 3** Release latch

The following illustration shows the controls and LEDs on the diagnostics panel.

Note: Diagnostics LEDs remain lit only while the server is connected to power.



A checkpoint code (See checkpoint code display **1**) is either a byte or a word value produced by UEFI and sent to the I/O port indicating the point at which the system stopped during the boot block and Power-On Self Test (POST). It does not provide error codes or suggest replacement components. These codes can be used by Lenovo Support for more in depth troubleshooting.

- **Remind button:** This button places the system-error LED on the front panel into Remind mode. In Remind mode, the system-error LED flashes once every 2 seconds until the problem is corrected, the system is restarted, or a new problem occurs.

By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem. The remind function is controlled by the IMM.

- **NMI button:** Press this button to force a nonmaskable interrupt to the microprocessor, if directed to do so by service and support.
- **Check-point code display:** During POST, this display indicates server firmware progress. The display does not provide error codes or suggest components to be replaced. Checkpoint codes can be used by Lenovo Support for further troubleshooting. See the *Hardware Maintenance Manual* for more information about checkpoint codes.

There are two types of checkpoint codes: field programmable gate array (FPGA) hardware checkpoint codes and UEFI checkpoint codes. The UEFI checkpoint codes might change because of code sequence and timing changes or when the server firmware is updated.

- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The reset button is in the lower right-hand corner of the diagnostics panel.

For more information about EasyLED diagnostics, see the *Hardware Maintenance Manual*.

The following table lists the LEDs on the EasyLED diagnostics panel and suggested actions to solve the detected problems.

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
LED	Description	Action
None, but the system-error LED is lit.	An error has occurred and cannot be diagnosed, or the IMM has failed. The error is not represented by an EasyLED diagnostics LED.	Use the Setup utility to check the system-event log for information about the error.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

LED	Description	Action
OVER SPEC	The server was shut down due to a power-supply overload condition on one of the power channels. The power supplies are using more power than the maximum rating.	<ol style="list-style-type: none"> 1. If any of the 12v power channel error LEDs (A, B, C, D, E, or AUX) on the system board are lit also, see “Solving power problems” on page 143. (See “Power-supply LEDs” on page 50 for the location of the power channel error LEDs.) 2. Check the power supply LEDs for an error indication (AC LED and DC LED are not both lit, or the power-supply error LED is lit). Swap power supplies 1 and 2 with each other. <ul style="list-style-type: none"> • If the error follows the power supply, replace the failed power supply. • If the error remains with the power bay, (trained service technician only) replace the system board. 3. Remove optional devices from the server.
LOG	An error message has been written to the system-event log	Check the IMM system event log and the system-error log for information about the error. Replace any components that are identified in the error logs.
LINK	Reserved.	
PS	A power supply has failed.	<ol style="list-style-type: none"> 1. Check the power supply LEDs for an error indication (AC LED and DC LED are not both lit). See “Power-supply LEDs” on page 50 for more information. 2. Make sure that the failing power supply is correctly seated. 3. Replace the failed power supply.
PCI	An error has occurred on a PCI bus or on the system board. An additional LED will be lit next to a failing PCI slot.	<ol style="list-style-type: none"> 1. Check the LEDs on the PCI slots to identify the component that is causing the error. 2. Check the system-event log for information about the error. 3. If you cannot isolate the failing adapter through the LEDs and the information in the system-event log, remove one adapter at a time from the failing PCI bus, and restart the server after each adapter is removed. 4. Call for service.
SP™	The service processor (the IMM) has failed.	<ol style="list-style-type: none"> 1. Remove power from the server; then, reconnect the server to power and restart the server. 2. Update the firmware on the IMM. 3. Call for service
FAN	A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit.	Replace the failing fan, which is indicated by a lit LED near the fan connector on the system board.
TEMP	The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit.	<ol style="list-style-type: none"> 1. Check the error log to identify where the over-temperature condition was measured. If a fan has failed, replace it. 2. Make sure that the room temperature is not too high. See Table 1 on page 19 for temperature information. 3. Make sure that the air vents are not blocked. 4. Call for service.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

LED	Description	Action
MEM	<p>When only the MEM LED is lit, a memory error has occurred.</p> <p>When the MEM and CNFG LEDs are lit, the memory configuration is not valid.</p>	<ol style="list-style-type: none"> 1. Determine whether the CNFG LED is also lit. If it is, run the memory test exerciser to isolate the problem (see <i>Hardware Maintenance Manual</i> for more information). <ol style="list-style-type: none"> a. If the test reports that a memory error has occurred, replace the failing DIMM, which is indicated by the lit LED on the system board. b. If the test reports the memory configuration is invalid, repopulate the DIMMs to a supported configuration. 2. If the CNFG LED is not lit, one of the following conditions should be present: <ul style="list-style-type: none"> • The server did not boot and a failing DIMM LED is lit. <ol style="list-style-type: none"> a. Check for a PFA log event in the System Event Log (SEL) b. Reseat the DIMM. c. If the problem remains, move the DIMM to a different slot. <ol style="list-style-type: none"> 1) If the DIMM LED lights up on the system board that corresponds to this new DIMM socket, replace the DIMM. 2) If the DIMM LED lights up on the system board that corresponds to the original DIMM socket, replace the system board (trained service technician only). • The server booted and the failing DIMM is disabled and the LED is lit. <ol style="list-style-type: none"> a. If the LEDs are lit by two DIMMs, check the System Event Log for PFA on one of the DIMMs, then replace that DIMM. Otherwise, replace both DIMMs. b. If the LED is lit by only one DIMM, replace that DIMM. c. Re-enable the DIMM sockets in the server firmware settings.
NMI	A nonmaskable interrupt has occurred, or the NMI button has been pressed.	Check the system-event log for information about the error.
CNFG	A hardware configuration error has occurred. (This LED is used with the MEM and the CPU LEDs.)	

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

LED	Description	Action
CPU	When only the CPU LED is lit, a microprocessor has failed. When the CPU and CNFG LEDs are lit, the microprocessor configuration is not valid.	<ol style="list-style-type: none"> 1. Determine whether the CNFG LED is also lit. If the CNFG LED is not lit, a microprocessor has failed. <ol style="list-style-type: none"> a. Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. See the <i>Hardware Maintenance Manual</i> for information about installing a microprocessor. b. If the failure remains, call service. 2. If the CNFG LED is lit, then an invalid microprocessor configuration has occurred. <ol style="list-style-type: none"> a. Make sure that the microprocessors are compatible with each other. They must match in speed and cache size. To compare the microprocessor information, run the Setup utility and select System Information, then select System Summary, and then select Processor Details. b. (Trained service technician only) Replace an incompatible microprocessor. c. If the failure remains, call for service.
VRM	Reserved.	
DASD	A hard disk drive error has occurred. A hard disk drive has failed or is missing.	<ol style="list-style-type: none"> 1. Check the LEDs on the hard disk drives for the drive with a lit status LED and reseal the hard disk drive. 2. Reseat the hard disk drive backplane. 3. Remove and reinstall the hard disk drive backplanes. 4. Replace the hard disk drive backplane for the failing drive or drives. 5. Call for service.
RAID	Reserved	
BRD	An error has occurred on the system board.	<ol style="list-style-type: none"> 1. Check the LEDs on the system board to identify the component that is causing the error. 2. Check the system-event log for information about the error. 3. Replace any failed or missing replaceable components, such as the battery or PCI riser-card assembly. 4. If a voltage regulator has failed, replace the system board.

Power-supply LEDs

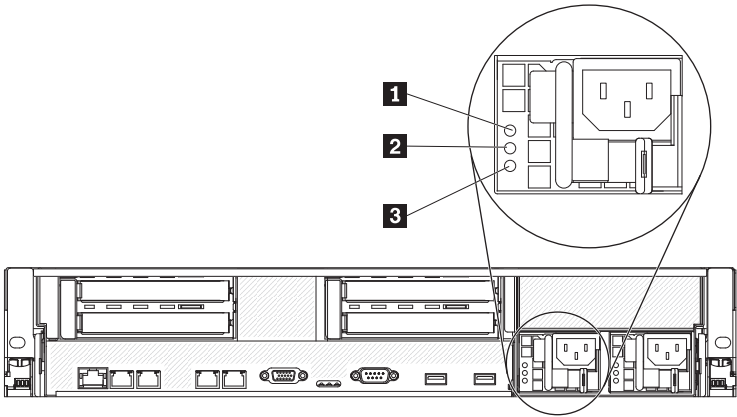
The following minimum configuration is required for the DC LED on the power supply to be lit:

- Power supply
- Power cord

The following minimum configuration is required for the server to start:

- One microprocessor
- One 1 GB DIMM per microprocessor on the system board
- One power supply

The following illustration shows the locations of the power-supply LEDs.



The following table describes the problems that are indicated by various combinations of the ac power-supply LEDs and the power-on LED on the operator information panel and suggested actions to correct the detected problems.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Power-supply LEDs			Description	Action	Notes
AC	DC	Error			
Off	Off	Off	No ac power to the server or a problem with the ac power source.	<ol style="list-style-type: none"> 1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 	Normal condition when no ac power is present.
Off	Off	On	No ac power to the server or a problem with the ac power source and the power supply had detected an internal problem.	<ol style="list-style-type: none"> 1. Replace the power supply. 2. Make sure that the power cord is connected to a functioning power source. 	This only happens when a second power supply is providing power to the server.
Off	On	Off	Faulty power supply	Replace the power supply.	
Off	On	On	Faulty power supply	Replace the power supply.	
On	Off	Off	Power supply not fully seated, faulty system board, or faulty power supply	<ol style="list-style-type: none"> 1. Reseat the power supply. 2. If the 240V Failure LED on the system board is lit, have the system board replaced. 3. If the 240V Failure LED on the system board is not lit, replace the power supply. 	Typically indicates a power supply is not fully seated.
On	Off	On	Faulty power supply	Replace the power supply.	
On	On	Off	Normal operation		
On	On	On	Power supply is faulty but still operational	Replace the power supply.	

Server power features

When the server is connected to a power source but is not turned on, the operating system does not run, and all core logic except for the Integrated Management Module (IMM) is shut down; however, the server can respond to requests from the IMM, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to power but is not turned on.

Turning on the server

Approximately 3 minutes after the server is connected to power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the

operating system by pressing the power-control button. If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.

For 32-bit operating systems only: Some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

Turning off the server

When you turn off the server and leave it connected to power, the server can respond to requests from the IMM, such as a remote request to turn on the server. While the server remains connected to power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Important: To view the error LEDs on the system board, leave the server connected to a power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The IMM can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the IMM.

Diagnostic programs, messages, and error codes

The diagnostic programs are the primary method of testing the major components of the server. As you run the diagnostic programs, text messages are displayed on the screen and are saved in the test log. A diagnostic text message indicates that a problem has been detected and provides the action you should take as a result of the text message.

Make sure that the server has the latest version of the diagnostic programs. To download the latest version, complete the following steps.

Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Utilities are available to reset and update the code on the integrated USB flash device, if the diagnostic partition becomes damaged and does not start the diagnostic programs. For more information and to download the utilities, go to <http://www.lenovo.com/support>.

Running the diagnostic programs

To run the diagnostic programs, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt Press F2 for Dynamic System Analysis (DSA) is displayed, press F2.

Note: The Preboot DSA diagnostic program might appear to be unresponsive for an unusual length of time when you start the program. This is normal operation while the program loads.

4. Optionally, select **Exit to DSA** to exit from the stand-alone memory diagnostic program.

Note: After you exit from the stand-alone memory diagnostic environment, you must restart the server to access the stand-alone memory diagnostic environment again.

5. Select **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the diagnostic programs do not detect any hardware errors but the problem remains during normal server operations, a software error might be the cause. If you suspect a software problem, see the information that comes with your software.

A single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run the diagnostic programs.

Exception: If there are multiple error codes or diagnostics LEDs that indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Solving Microprocessor problems” on page 144 for information about diagnosing microprocessor problems.

If the server stops during testing and you cannot continue, restart the server and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

Diagnostic text messages

Diagnostic text messages are displayed while the tests are running. A diagnostic text message contains one of the following results:

Passed: The test was completed without any errors.

Failed: The test detected an error.

Aborted: The test could not proceed because of the server configuration.

Additional information concerning test failures is available in the extended diagnostic results for each test.

Viewing the test log

To view the test log when the tests are completed, type the **view** command in the DSA interactive menu, or select **Diagnostic Event Log** in the graphical user interface. To transfer DSA collections to an external USB device, type the **copy** command in the DSA interactive menu.

Diagnostic messages

The following table describes the messages that the diagnostic programs might generate and suggested actions to correct the detected problems. Follow the suggested actions in the order in which they are listed in the action column.

Table 3. DSA diagnostic messages

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
089-801-xxx	CPU	CPU Stress Test	Aborted	Internal program error.	<ol style="list-style-type: none"> Turn off and restart the system. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DISA. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Turn off and restart the system if necessary to recover from a hung state. Run the test again. (Continued on the next page)
089-801-xxx (continued)					<ol style="list-style-type: none"> Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ol style="list-style-type: none"> (Trained service technician only) Microprocessor (see “Removing a microprocessor and heat sink” on page 216 and “Installing a microprocessor and heat sink” on page 218). If the failure remains, collect the data from the DSA event log and send it to Lenovo service. For information about contacting and sending data to Lenovo, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	<ol style="list-style-type: none"> Turn off and restart the system. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DISA. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Turn off and restart the system if necessary to recover from a hung state. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	<ol style="list-style-type: none"> Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ol style="list-style-type: none"> (Trained service technician only) Microprocessor (see “Removing a microprocessor and heat sink” on page 216 and “Installing a microprocessor and heat sink” on page 218). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.
089-901-xxx	CPU	CPU Stress Test	Failed	Test failure.	<ol style="list-style-type: none"> Turn off and restart the system if necessary to recover from a hung state. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVDSA. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Turn off and restart the system if necessary to recover from a hung state. Run the test again. <p>(Continued on the next page)</p>

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
089-901-xxx (continued)					<ol style="list-style-type: none"> Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ol style="list-style-type: none"> (Trained service technician only) Microprocessor (see “Removing a microprocessor and heat sink” on page 216 and “Installing a microprocessor and heat sink” on page 218). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.
166-801-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: the RMM returned an incorrect response length.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVDSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-802-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: the test cannot be completed for an unknown reason.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-803-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: the node is busy; try later.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-804-xxx	BMC	BMC 12C Test	Aborted	BMC 12C test canceled: invalid command.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the BMC firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-805-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: invalid command for the given LUN.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DISA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-806-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: timeout while processing the command.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-807-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: out of space.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-808-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: reservation canceled or invalid reservation ID.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-809-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: request data was truncated.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-810-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: request data length is invalid.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the BMC firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-811-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: request data field length limit is exceeded.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-812-xxx	RMM	12C Test	Aborted	RMM 12C Test canceled a parameter is out of range.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-813-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: cannot return the number of requested data bytes.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-814-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: requested sensor, data, or record is not present.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-815-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: invalid data field in the request.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-816-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: the command is illegal for the specified sensor or record type.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-817-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: a command response could not be provided.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-818-xxx	RMM	12C Test	Aborted	IMM 12C test canceled: cannot execute a duplicated request.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-819-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: a command response could not be provided; the SDR repository is in update mode.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.
166-820-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: a command response could not be provided; the device is in firmware update mode.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-821-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: a command response could not be provided; RMM initialization is in progress.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-822-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: the destination is unavailable.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-823-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: cannot execute the command; insufficient privilege level.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-824-xxx	RMM	12C Test	Aborted	RMM 12C test canceled: cannot execute the command.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-901-xxx	RMM	I2C Test	Failed	The RMM indicates a failure in the H8 bus (Bus 0).	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA diagnostic event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Remove power from the system. 8. (Trained service technician only) Reseat the system board. 9. Reconnect the system to power and turn on the system. 10. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-902-xxx	RMM	I2C Test	Failed	The RMM indicates a failure in the light path bus.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA diagnostic event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Disconnect the system from the power source. 8. Reseat the light path card. 9. Reconnect the system to the power source. 10. Run the test again. 11. Disconnect the system from the power source. 12. (Trained service technician only) Reseat the system board. 13. Reconnect the system to the power source. 14. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-903-xxx	RMM	I2C Test	Failed	The RMM indicates a failure in the DIMM bus (Bus 2).	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA diagnostic event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Disconnect the system from the power source. h. Replace the DIMMs one by one and test after each replacement. i. Reconnect the system to the power source. j. Run the test again. k. Disconnect the system from the power source. l. Reseat all the DIMMs. m. (Trained service technician only) Reseat the system board. n. Reconnect the system to the power source. o. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-904-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the power supply bus (Bus 3).h	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA diagnostic code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Disconnect the system from the power source. h. Reseat the power supply backplane. i. Reconnect the system to the power source. j. Run the test again. k. Disconnect the system from the power source. l. (Trained service technician only) Reseat the system board. m. Reconnect the system to power and turn on the system. n. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-905-xxx	RMM	I2C Test	Failed	The RMM indicates a failure in the HDD bus (Bus 4).	<ul style="list-style-type: none"> a. Ignore the error if the hard disk drive backplane is not installed. b. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. c. After 45 seconds, reconnect the system to the power source and turn on the system. d. Run the test again. e. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. f. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA diagnostic event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. g. Run the test again. h. Disconnect the system from the power source. i. Reconnect the system to the power source and turn on the system. j. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-906-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory configuration bus (Bus 5).	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA diagnostic event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Disconnect the system from the power source. h. (Trained service technician only) Reseat the system board. i. Reconnect the system to the power source and turn on the system. j. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-907-xxx	RMM	12C Test	Failed	The IMM indicates a failure in the power backplane bus.	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Remove power from the system. h. Reseat all connections to the power backplane. i. Reconnect the system to power and turn on the system. j. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-908-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the microprocessor bus.	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-909-xxx	RMM	12C Test	Failed	The IMM indicates a failure in the hard disk drive bus.	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Remove power from the system. h. Reseat all connections in the hard disk subsystem, which can include hard disk drives, SCSI or SAS cables, a hard disk backplane, and a hard disk drive or RAID controller. i. Reconnect the system to power and turn on the system. j. Run the test again

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-910-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the PCIe and light path diagnostics bus.	<ul style="list-style-type: none"> a. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. b. After 45 seconds, reconnect the system to the power source and turn on the system. c. Run the test again. d. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. e. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. f. Run the test again. g. Remove power from the system. h. Check the operator information panel cabling at both ends for loose or broken connections or damage to the cable. Replace the operator information panel cable if it is damaged. i. Reconnect the system to power and turn on the system. j. Run the test again

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-911-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the reported memory size is the same as the installed memory size, complete the following steps. <ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. Reseat all the memory DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). Reconnect the system to the power source and turn on the system. Run the test again. If the problem remains, continue with the next step.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-911-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory bus.	<ol style="list-style-type: none"> 8. Turn off the system and disconnect it from the power source. 9. Remove all DIMMs (see “Removing a memory module (DIMM)” on page 186). 10. Install the minimum memory configuration for the system . To determine the minimum memory configuration for your system, see “Features and technologies” on page 15. 11. Reconnect the system to the power source and turn on the system. 12. Make sure that the reported memory size is the same as the installed memory size. 13. Run the test again. If the memory passes the test, one of the uninstalled DIMMs is the failing component. 14. Repeat the steps to remove all DIMMs as necessary, using different DIMMs to isolate the failing component. Change only one component each time to identify the specific cause of the error. 15. Replace the failing DIMM.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-915-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 1 SPD bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the reported memory size is the same as the installed memory size, complete the following steps. <ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. Reseat all the memory DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). Reconnect the system to the power source and turn on the system. Run the test again. If the problem remains, continue with the next step. Turn off the system and disconnect it from the power source. Remove all DIMMs.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-915-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 1 SPD bus.	<ol style="list-style-type: none"> 10. Install the minimum memory configuration for the system (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). To determine the minimum memory configuration for your system, see “Features and technologies” on page 15. 11. Reconnect the system to the power source and turn on the system. 12. Make sure that the reported memory size is the same as the installed memory size. 13. Run the test again. If the memory passes the test, one of the uninstalled DIMMs is the failing component. 14. Repeat the steps to remove all DIMMs as necessary, using different DIMMs to isolate the failing component. Change only one component each time to identify the specific cause of the error. 15. Replace the failing DIMM.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-916-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 2 SPD bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the reported memory size is the same as the installed memory size, complete the following steps. <ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. Reseat all the memory DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). Reconnect the system to the power source and turn on the system. Run the test again. If the problem remains, continue with the next step. Turn off the system and disconnect it from the power source. Remove all DIMMs.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-916-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 2 SPD bus.	<ol style="list-style-type: none"> 10. Install the minimum memory configuration for the system (see “Installing a DIMM” on page 192). To determine the minimum memory configuration for your system, see “Features and technologies” on page 15. 11. Reconnect the system to the power source and turn on the system. 12. Make sure that the reported memory size is the same as the installed memory size. 13. Run the test again. If the memory passes the test, one of the uninstalled DIMMs is the failing component. 14. Repeat the steps to remove all DIMMs as necessary, using different DIMMs to isolate the failing component. Change only one component each time to identify the specific cause of the error. 15. Replace the failing DIMM.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-917-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 3 SPD bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the reported memory size is the same as the installed memory size, complete the following steps. <ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. Reseat all the memory DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). Reconnect the system to the power source and turn on the system. Run the test again. If the problem remains, continue with the next step. Turn off the system and disconnect it from the power source. Remove all DIMMs.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-917-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 3 SPD bus.	<ol style="list-style-type: none"> 10. Install the minimum memory configuration for the system (see “Installing a DIMM” on page 192). To determine the minimum memory configuration for your system, see “Features and technologies” on page 15. 11. Reconnect the system to the power source and turn on the system. 12. Make sure that the reported memory size is the same as the installed memory size. 13. Run the test again. If the memory passes the test, one of the uninstalled memory cards or DIMMs is the failing component. 14. Repeat the steps to remove all memory cards and DIMMs as necessary, using different memory cards and DIMMs to isolate the failing component. Change only one component each time to identify the specific cause of the error. 15. Replace the failing memory card or DIMM.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-918-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 4 SPD bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the reported memory size is the same as the installed memory size, complete the following steps. <ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. Reseat all the memory DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). Reconnect the system to the power source and turn on the system. Run the test again. If the problem remains, continue with the next step. Turn off the system and disconnect it from the power source. Remove all memory cards and DIMMs.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-918-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 4 SPD bus.	<ol style="list-style-type: none"> 10. Install the minimum memory configuration for the system (see “Installing a DIMM” on page 192). To determine the minimum memory configuration for your system, see “Features and technologies” on page 15. 11. Reconnect the system to the power source and turn on the system. 12. Make sure that the reported memory size is the same as the installed memory size. 13. Run the test again. If the memory passes the test, one of the uninstalled DIMMs is the failing component. 14. Repeat the steps to remove all DIMMs as necessary, using different DIMMs to isolate the failing component. Change only one component each time to identify the specific cause of the error. 15. Replace the failing DIMM.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-919-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 1 light path diagnostics bus.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. Reconnect the system to the power source and turn on the system. 9. Make sure that the reported memory size is the same as the installed memory size. 10. If the problem remains, replace the memory card in memory-card connector 1.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-920-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 2 light path diagnostics bus.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the RMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. Reconnect the system to the power source and turn on the system. 9. Make sure that the reported memory size is the same as the installed memory size.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-921-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 3 light path diagnostics bus.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the BMC firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Make sure that the reported memory size is the same as the installed memory size. If the problem remains, replace the memory card in memory-card connector 3.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
166-922-xxx	RMM	12C Test	Failed	The RMM indicates a failure in the memory card 4 light path diagnostics bus.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the BMC. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the RMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. Reconnect the system to the power source and turn on the system. 9. Make sure that the reported memory size is the same as the installed memory size. 10. If the problem remains, replace the memory card in memory-card connector 4.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
180-901-xxx	Check-point panel	Check-point panel test	Failed		<ol style="list-style-type: none"> Check the operator information panel cabling at both ends for loose or broken connections or damage to the cable. Replace the operator information panel cable if it is damaged. Run the test again. Replace the operator information panel assembly (see “Removing the operator information panel assembly” on page 160 and “Installing the operator information panel assembly” on page 161). Run the test again.
201-801-xxx	Memory	Memory Test	Aborted	Test canceled: the system UEFI programmed the memory controller with an invalid CBAR address	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-802-xxx	Memory	Memory Test	Aborted	Test canceled: the end address in the E820 function is less than 16 MB.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that all DIMMs are enabled in the Server Configuration and Boot Management program (see the information in <i>Installation and User Guide</i>). 4. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 5. Run the test again.
201-803-xxx	Memory	Memory Test	Aborted	Test canceled: could not enable the processor cache.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again.
201-804-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller buffer request failed.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-805-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller display/alter write operation was not completed.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again.
201-806-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller fast scrub operation was not completed.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again.
201-807-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller buffer free request failed.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-808-xxx	Memory	Memory Test	Aborted	Test canceled: memory controller display/alter buffer execute error.	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again.
201-809-xxx	Memory	Memory Test	Aborted	Test canceled program error: operation running fast scrub.	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DISA. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-810-xxx	Memory	Memory Test	Aborted	Test canceled: unknown error code xxx received in COMMONEXIT procedure.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 4. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 5. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-901-xxx	Memory	Memory Test	Failed	Test failure: single-bit error, failing bank x, failing DIMM z.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. 2. Reseat DIMM z (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). 3. Reconnect the system to power and turn on the system. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Server Configuration and Boot Management program. 9. Run the test again. 10. Replace the failing memory card .

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
201-902-xxx	Memory	Memory Test	Failed	Test failure: single-bit and multi-bit error, failing bank x, failing DIMM z	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. 2. Reseat DIMM z (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). 3. Reconnect the system to power and turn on the system. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 5. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Server Configuration and Boot Management program (see the information in <i>Installation and User Guide</i>). 9. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
202-801-xxx	Memory	Memory Stress Test	Aborted	Internal program error.	<ol style="list-style-type: none"> Turn off and restart the system. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Make sure that the system UEFI code is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Turn off and restart the system if necessary to recover from a hung state. Run the memory diagnostics to identify the specific failing DIMM.
202-802-xxx	Memory	Memory Stress Test	Failed	General error: memory size is insufficient to run the test.	<ol style="list-style-type: none"> Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA event log. If necessary, enable all memory in the Server Configuration and Boot Management program. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Run the test again. Run the standard memory test to validate all memory.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
202-901-xxx	Memory	Memory Stress Test	Failed	Test failure.	<ol style="list-style-type: none"> 1. Run the standard memory test to validate all memory. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 3. Turn off the system and disconnect it from power. 4. Reseat the DIMMs (see “Removing a memory module (DIMM)” on page 186 and “Installing a DIMM” on page 192). 5. Reconnect the system to power and turn on the system. 6. Run the test again.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-801-xxx	Optical Drive	<ul style="list-style-type: none"> Verify Media Installed Read/Write Test Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Unable to communicate with the device driver.	<ol style="list-style-type: none"> Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Run the test again. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. Run the test again. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-802-xxx	Optical Drive	<ul style="list-style-type: none"> Verify Media Installed Read/Write Test Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	The media tray is open.	<ol style="list-style-type: none"> Close the media tray and wait 15 seconds. Run the test again. Insert a new CD or DVD into the drive and wait for 15 seconds for the media to be recognized. Run the test again. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. Run the test again. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. Run the test again. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-803-xxx	Optical Drive	<ul style="list-style-type: none"> Verify Media Installed Read/Write Test Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	The disc might be in use by the system.	<ol style="list-style-type: none"> Wait for the system activity to stop. Run the test again Turn off and restart the system. Run the test again. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.
215-901-xxx	Optical Drive	<ul style="list-style-type: none"> Verify Media Installed Read/Write Test Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Drive media is not detected.	<ol style="list-style-type: none"> Insert a CD or DVD into the drive or try a new media, and wait for 15 seconds. Run the test again. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. Run the test again. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. Run the test again. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-902-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	Read miscompare.	<ol style="list-style-type: none"> 1. Insert a CD or DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). 8. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-903-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Could not access the drive.	<ol style="list-style-type: none"> 1. Insert a CD or DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 6. Run the test again. 7. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 8. Run the test again. 9. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). 10. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
215-904-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	A read error occurred.	<ol style="list-style-type: none"> 1. Insert a CD or DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559. 6. Run the test again. 7. Replace the CD or DVD drive (see “Removing a CD-RW/DVD drive” on page 213 and “Installing a CD-RW/DVD drive” on page 214). 8. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
Tape drive test (Error Messages apply to results of any of the 4 tests)	Presence Test Self Test Load Tape Test Tape Alert Check Test		Failed	An error was found in the tape alert log page.	<ol style="list-style-type: none"> 1. Clean the tape drive, using the appropriate cleaning media, and insert new media. 2. Run the test again. 3. Clear the error log. 4. Run the test again. 5. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. 6. Run the test again. 7. Note the tape alert flag that is returned in the tape alert log. See “Tape alert flags” on page 133. 8. Replace the tape drive if a hardware failure is indicated. 9. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
				Media is not detected.	<ol style="list-style-type: none"> 1. Clean the tape drive, using the appropriate cleaning media, and insert new media. 2. Run the test again. 3. Clear the error log. 4. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. 5. Run the test again. 6. Replace the tape drive. 7. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.
			Failed	Media error.	<ol style="list-style-type: none"> 1. Clean the tape drive, using the appropriate cleaning media, and insert new media. 2. Run the test again. 3. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. 4. Run the test again. 5. Replace the tape drive. 6. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
			Failed	Drive hardware error.	<ol style="list-style-type: none"> 1. Check the tape drive cabling for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 2. Clean the tape drive, using the appropriate cleaning media, and insert new media. 3. Run the test again. 4. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. 5. Run the test again. 6. Replace the tape drive. 7. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
				Software error: invalid request.	<ol style="list-style-type: none"> If the system has stopped responding, turn off and restart the system. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. If the system has stopped responding, turn off and restart the system. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. Run the test again. Clean the tape drive, using the appropriate cleaning media, and insert new media. Replace the tape drive. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
				Unrecognized error.	<ol style="list-style-type: none"> 1. Clean the tape drive, using the appropriate cleaning media, and insert new media. 2. Run the test again. 3. Make sure that the drive firmware is at the latest level. For the latest level of drive firmware and software for tape drives and libraries, go to http://www.ibm.com/support/docview.wss?uid=psg1TAPE-FILES. 4. Run the test again. 5. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA. 6. Run the test again. 7. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 8. Run the test again. 9. Replace the tape drive. 10. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
217-901-xxx	SAS/SATA Hard Drive	Disk Drive Test	Failed		<ol style="list-style-type: none"> Reseat all backplane connections at both ends. Reseat all the drives (see “Removing a hot-swap hard disk drive” on page 211 and “Installing a hot-swap hard disk drive” on page 211). Run the test again. Make sure that the firmware is at the latest level. Run the test again. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.
405-901-xxx	BroadCom Ethernet Device	Test Control Registers	Failed		<ol style="list-style-type: none"> Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-901-xxx	BroadCom Ethernet Device	Test MII Registers	Failed		<ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-902-xxx	BroadCom Ethernet Device	Test EEPROM	Failed		<ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-903-xxx	BroadCom Ethernet Device	Test Internal Memory	Failed		<ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Server Configuration and Boot Management program to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-904-xxx	BroadCom Ethernet Device	Test Interrupt	Failed		<ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Server Configuration and Boot Management program to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-906-xxx	BroadCom Ethernet Device	Test Loop back at Physical Layer	Failed		<ol style="list-style-type: none"> 1. Check the Ethernet cable for damage and make sure that the cable type and connection are correct. 2. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 3. Run the test again. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-906-xxx	BroadCom Ethernet Device	Test Loop back at MAC -Layer	Failed		<ol style="list-style-type: none"> Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. Run the test again. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Table 3. DSA diagnostic messages (continued)

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 					
Message number	Component	Test	State	Description	Action
405-907-xxx	BroadCom Ethernet Device	Test LEDs	Failed		<ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1_MIGR-4JTS2T and select your system to display a matrix of available firmware. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter (see “Removing a PCI adapter” on page 179 and “Installing a PCI adapter” on page 180). Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, go to http://www.ibm.com/support/docview.wss?uid=psg1SERVCALL.

Tape alert flags

Tape alert flags are numbered 1 through 64 and indicate a specific media-changer error condition. Each tape alert is returned as an individual log parameter, and its state is indicated in bit 0 of the 1-byte Parameter Value field of the log parameter. When this bit is set to 1, the alert is active.

Each tape alert flag has one of the following severity levels:

- C - Critical
- W - Warning
- I - Information

Different tape drives support some or all of the following flags in the tape alert log:

Flag 2: Library Hardware B (W) This flag is set when an unrecoverable mechanical error occurs.

Flag 4: Library Hardware D (C) This flag is set when the tape drive fails the power-on self-test or a mechanical error occurs that requires a power cycle to recover. This flag is internally cleared when the drive is powered-off.

Flag 13: Library Pick Retry (W) This flag is set when a high retry count threshold is passed during an operation to pick a cartridge from a slot before the operation succeeds. This flag is internally cleared when another pick operation is attempted.

Flag 14: Library Place Retry (W) This flag is set when a high retry count threshold is passed during an operation to place a cartridge back into a slot before the operation succeeds. This flag is internally cleared when another place operation is attempted.

Flag 15: Library Load Retry (W) This flag is set when a high retry count threshold is passed during an operation to load a cartridge into a drive before the operation succeeds. This flag is internally cleared when another load operation is attempted. Note that if the load operation fails because of a media or drive problem, the drive sets the applicable tape alert flags.

Flag 16: Library Door (C) This flag is set when media move operations cannot be performed because a door is open. This flag is internally cleared when the door is closed.

Flag 23: Library Scan Retry (W) This flag is set when a high retry count threshold is passed during an operation to scan the bar code on a cartridge before the operation succeeds. This flag is internally cleared when another bar code scanning operation is attempted.

Recovering the UEFI code

If the UEFI code has become damaged, such as from a power failure during an update, you can recover the uEFI code using the boot block jumper and a UEFI recovery diskette.

Notes:

1. You can obtain a UEFI recovery diskette from one of the following sources:
 - Download the UEFI code update from the World Wide Web and use it to make a recovery diskette.
 - Contact your Lenovo service representative.
2. To create and use a diskette, you must add an optional external diskette drive to the server.

To download the UEFI code update from the World Wide Web, complete the following steps:

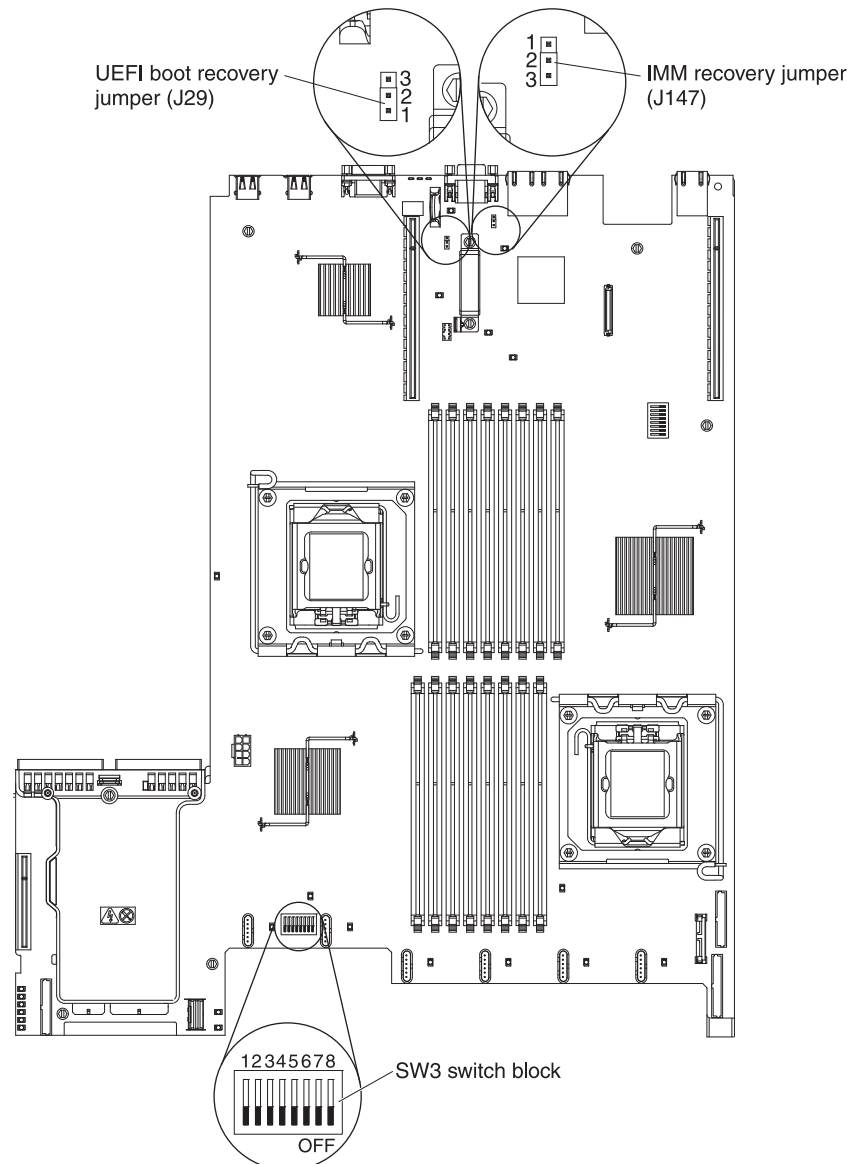
Note: Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to <http://www.ibm.com/systems/support/>.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. Click **System x3650 M2** to display the matrix of downloadable files for the server.
5. Download the latest UEFI code update.
6. Create the UEFI recovery diskette, following the instructions that come with the update file that you downloaded.

The flash memory of the server consists of a primary page and a backup page. The backup page is a protected area that cannot be overwritten. If the primary page becomes corrupted, the server boots from the backup page, which enables you to replace the UEFI code for the primary page.

To recover the UEFI code and restore the server operation to the primary page, complete the following steps:

1. Turn off the server, and disconnect all power cords and external cables.
2. Remove the server cover. See “Removing the cover” on page 159 for more information.
3. Locate the UEFI boot recovery jumper block (J29) on the system board.



4. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the UEFI recovery mode.
5. Insert the UEFI recovery diskette into the diskette drive.
6. Reinstall the server cover; then, reconnect all power cords.
7. Restart the server. The power-on self test (POST) starts.

8. Select **1 - Update POST/UEFI** from the menu that contains various flash update options.
9. When you are asked whether you want to save the current code to a diskette, press N.
10. When you are asked to choose a language, select a language (from 0 to 7) and press Enter.
11. Remove the UEFI recovery diskette from the diskette drive.
12. Turn off the server, and disconnect all power cords and external cables; then, remove the server cover.
13. Remove the jumper from the boot block recovery jumper block, or move it to pins 1 and 2, to return to normal startup mode.
14. Reconnect all external cables and power cords, and turn on the peripheral devices; then, reinstall the server cover.
15. Restart the server.

System event/error log messages

***** REVIEWERS: what are the event and error messages in Victory? *****

The system event/error log can contain messages of three types:

Information	Information messages do not require action; they record significant system-level events, such as when the server is started.
Warning	Warning messages do not require immediate action; they indicate possible problems, such as when the recommended maximum ambient temperature is exceeded.
Error	Error messages might require action; they indicate system errors, such as when a fan is not detected.

Each message contains date and time information, and it indicates the source of the message (POST/UEFI or the service processor).

Note: The RMM system event log, which you can view through the Server Configuration and Boot Management program, also contains many information, warning, and error messages.

The following table describes the possible system event/error log messages and suggested actions to correct the detected problems.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

System event/error log message	Action
+12v critical over voltage fault	<ol style="list-style-type: none"> 1. If the OVER SPEC LED on the light path diagnostics panel is lit, or any of the four power channel error LEDs (A, B, C, or D) on the system board are lit, see the entries about power-channel error LEDs in “Solving power problems” on page 143. (See “Power-supply LEDs” on page 50 for the location of the power channel error LEDs.) 2. If the actions in “Solving power problems” on page 143 do not identify a defective component, complete the following steps: <ol style="list-style-type: none"> a. Remove the power supplies. b. Replace the power supplies one at a time, restarting the server each time, to isolate a failing power supply. c. If the server fails to start, replace the power backplane. Restart the server. d. If the server fails to start, (trained service technician only) replace the system board.
+12v critical under voltage fault	<ol style="list-style-type: none"> 1. If the OVER SPEC LED on the light path diagnostics panel is lit, or any of the four power channel error LEDs (A, B, C, or D) on the system board are lit, see the entries about power-channel error LEDs in “Solving power problems” on page 143. (See “Power-supply LEDs” on page 50 for the location of the power channel error LEDs.) 2. If the actions in “Solving power problems” on page 143 do not identify a defective component, complete the following steps: <ol style="list-style-type: none"> a. Remove the power supplies. b. Replace the power supplies one at a time, restarting the server each time, to isolate a failing power supply. c. If the server fails to start, replace the power backplane. Restart the server. d. If the server fails to start, (trained service technician only) replace the system board.
12v planar fault	<ol style="list-style-type: none"> 1. If the OVER SPEC LED on the light path diagnostics panel is lit, or any of the four power channel error LEDs (A, B, C, or D) on the system board are lit, see the entries about power-channel error LEDs in “Solving power problems” on page 143. (See “Power-supply LEDs” on page 50 for the location of the power channel error LEDs.) 2. If the actions in “Solving power problems” on page 143 do not identify a defective component, complete the following steps: <ol style="list-style-type: none"> a. Remove the power supplies. b. Replace the power supplies one at a time, restarting the server each time, to isolate a failing power supply. c. If the server fails to start, replace the power backplane. Restart the server. d. If the server fails to start, (trained service technician only) replace the system board.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

System event/error log message	Action
+5v critical over voltage fault	<ol style="list-style-type: none"> 1. Remove the following devices, which are powered by 5 volts: <ul style="list-style-type: none"> • All PCI adapters • USB devices • CD-RW/DVD drive • Tape drive, if one is installed • Hard disk drive backplane 2. Reinstall each I/O device removed in step 1, one at a time, restarting the server each time, to isolate a defective device. Replace any defective device. 3. If the error continues, replace the power backplane. Restart the server. 4. If the error continues, (trained service technician only) replace the system board.
+5v critical under voltage fault	<ol style="list-style-type: none"> 1. Remove the following devices, which are powered by 5 volts: <ul style="list-style-type: none"> • All PCI adapters • USB devices • CD-RW/DVD drive • Tape drive, if one is installed • Hard disk drive backplane 2. Reinstall each I/O device removed in step 1, one at a time, restarting the server each time, to isolate a defective device. Replace any defective device. 3. If the error continues, replace the power backplane. Restart the server. 4. If the error continues, (trained service technician only) replace the system board.
5V fault	<ol style="list-style-type: none"> 1. Remove the following devices, which are powered by 5 volts: <ul style="list-style-type: none"> • All PCI adapters • USB devices • CD-RW/DVD drive • Tape drive, if one is installed • Hard disk drive backplane 2. Reinstall each I/O device removed in step 1, one at a time, restarting the server each time, to isolate a defective device. Replace any defective device. 3. If the error continues, replace the power backplane. Restart the server. 4. If the error continues, (trained service technician only) replace the system board.
+2.5v critical over voltage fault	Information only
+2.5v critical under voltage fault	Information only

<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
System event/error log message	Action
+1.8v critical over voltage fault	Information only
+1.8v critical under voltage fault	Information only
The system real time clock battery is no longer reliable.	Replace the battery.
+3.3v critical over voltage fault	<ol style="list-style-type: none"> 1. Remove all PCI adapters. 2. Reinstall each PCI adapter, one at a time, restarting the server each time, to isolate a defective adapter. Replace any defective adapter. 3. If the error continues, (trained service technician only) replace the system board.
+3.3v critical under voltage fault	<ol style="list-style-type: none"> 1. Remove all PCI adapters. 2. Reinstall each PCI adapter, one at a time, restarting the server each time, to isolate a defective adapter. Replace any defective adapter. 3. If the error continues, (trained service technician only) replace the system board.
3.3V Bus Fault	<ol style="list-style-type: none"> 1. Remove all PCI adapters. 2. Reinstall each PCI adapter, one at a time, restarting the server each time, to isolate a defective adapter. Replace any defective adapter. 3. If the error continues, (trained service technician only) replace the system board.
Power Good Fault	<ol style="list-style-type: none"> 1. Reseat the power supplies. 2. If the error continues, replace the power backplane.
VRM 1 Power Good Fault	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor 1. 2. (Trained service technician only) Replace microprocessor 1. 3. (Trained service technician only) Replace the system board.
VRM 2 Power Good Fault	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor 2. 2. (Trained service technician only) Replace microprocessor 2. 3. (Trained service technician only) Replace the system board.
VRM 2 is present	Information only
VRM 2 is not present	If microprocessor 2 is installed, (trained service technician only) replace the system board.
Memory Area non-critical over temperature warning	<ol style="list-style-type: none"> 1. Make sure that the fans are operating and are not obstructed. 2. Make sure that the air baffles are in place and correctly installed. 3. Make sure that the server cover is installed and fully closed.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

System event/error log message	Action
Memory Area non-recoverable over temperature fault	<ol style="list-style-type: none"> 1. Make sure that the fans are operating and are not obstructed. 2. Make sure that the air baffles are in place and correctly installed. 3. Make sure that the server cover is installed and fully closed. 4. (Trained service technician only) Replace the system board.
Fan <i>n</i> Failure <i>n</i> = the fan number	<ol style="list-style-type: none"> 1. Make sure that the connector on the fan is not damaged. 2. Make sure that the fan connector on the system board is not damaged. 3. Make sure that the fan is fully installed (press down on the fan). 4. Reseat fan <i>n</i>. 5. Replace fan <i>n</i>.
Fan <i>n</i> Fault <i>n</i> = the fan number	<ol style="list-style-type: none"> 1. Make sure that the connector on the fan is not damaged. 2. Make sure that the fan connector on the system board is not damaged. 3. Make sure that the fan is fully installed (press down on the fan). 4. Reseat fan <i>n</i>. 5. Replace fan <i>n</i>.
Hard Drive <i>n</i> Fault <i>n</i> = the hard disk drive number	<ol style="list-style-type: none"> 1. Reseat hard disk drive <i>n</i>. 2. Replace hard disk drive <i>n</i>.
Hard drive <i>n</i> removal detected. <i>n</i> = the hard disk drive number	Reseat hard disk drive <i>n</i> .
Power supply <i>n</i> removed <i>n</i> = the power supply number	<ol style="list-style-type: none"> 1. Reseat power supply <i>n</i>. 2. Replace power supply <i>n</i>. 3. Replace the power backplane.
Power supply <i>n</i> fault <i>n</i> = the power supply number	<ol style="list-style-type: none"> 1. If the server power-on LED is lit, perform the following steps: <ol style="list-style-type: none"> a. Reduce the server to the minimum configuration (see “Features and technologies” on page 15 for a description of the minimum configuration). b. Reinstall the components you removed, one at a time, restarting the server each time. c. If the error reoccurs, the component you just reinstalled is defective; replace the defective component. 2. Reseat the following components: <ol style="list-style-type: none"> a. Power supply <i>n</i> b. Power backplane 3. Replace the components listed in step 2, one at a time, in the order shown, restarting the server each time.

<ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 	
System event/error log message	Action
Power supply <i>n</i> AC power removed <i>n</i> = the power supply number	<ol style="list-style-type: none"> Make sure that the power cords are correctly connected to the server and to a working power source. Replace power supply <i>n</i>. Replace the power backplane.
Power supply <i>n</i> fan fault <i>n</i> = the power supply number	<ol style="list-style-type: none"> Make sure that there are no obstructions, such as bundled cables, to the airflow on the power-supply fan. Replace power supply <i>n</i>.
Power supply current exceeded max spec value	<ol style="list-style-type: none"> Make sure that two power supplies are installed, and that the power cords are correctly connected to the power supplies and to a working power source. Replace the power backplane.
Front panel NMI	<ol style="list-style-type: none"> If the MEM LED on the light path diagnostics panel is lit, complete the following steps: <ol style="list-style-type: none"> Check the other system logs for related entries and actions. Reinstall the server device drivers. Reinstall the operating system. If the error LED for PCI slot 1 or PCI slot 2 on the riser card is lit, complete the following steps: <ol style="list-style-type: none"> Remove the adapter from the PCI slot that has the lit error LED. If the error continues, replace the riser-card assembly. (Trained service technician only) If the error continues, replace the system board. If the error LED for PCI slot 3 or PCI slot 4 on the system board is lit, complete the following steps: <ol style="list-style-type: none"> Remove the adapter from the PCI slot that has the lit error LED. (Trained service technician only) If the error continues, replace the system board. Remove all PCI adapters from the server. (Trained service technician only) If the error continues, replace the system board.
Software NMI	Information only
CPU <i>n</i> IERR detected, the system has been restarted <i>n</i> = the microprocessor number	<ol style="list-style-type: none"> Make sure that you have installed the latest levels of firmware and device drivers for all adapters and standard devices, such as Ethernet, SCSI, or SAS. Run the diagnostics programs for the hard disk drives and other I/O devices. (Trained service technician only) Replace microprocessor <i>n</i>.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

System event/error log message	Action
CPU <i>n</i> IERR, the CPU has been disabled <i>n</i> = the microprocessor number	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor <i>n</i>. 2. (Trained service technician only) Replace microprocessor <i>n</i>. 3. (Trained service technician only) Replace the system board.
CPU <i>n</i> over temperature <i>n</i> = the microprocessor number	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>.
CPU removal detected	Information only. Take action as appropriate.
CPU <i>n</i> non-critical over temperature warning <i>n</i> = the microprocessor number	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly.
CPU <i>n</i> non-recoverable over temperature fault	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i> 4. (Trained service technician only) Replace the system board.
VRD 1 critical over voltage fault	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor 1. 2. (Trained service technician only) Replace the system board.
VRD 1 critical under voltage fault	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor 1. 2. (Trained service technician only) Replace the system board.
VRD 2 critical over voltage fault VRD 2 = VRM	<ol style="list-style-type: none"> 1. Reseat the VRM. 2. (Trained service technician only) Reseat microprocessor 2. 3. (Trained service technician only) Replace the system board.
VRD 2 critical under voltage fault VRD 2 = VRM	<ol style="list-style-type: none"> 1. Reseat the VRM. 2. (Trained service technician only) Reseat microprocessor 2. 3. (Trained service technician only) Replace the system board.
Processor VTT Power Fault.	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat microprocessor 1. 2. (Trained service technician only) Replace the system board.

Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:

1. Turn off the server and disconnect all power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. If a power-channel error LED on the system board is lit, perform the following steps; otherwise, go to step Solving power problems. See “System-board LEDs” on page 154 for the location of the power-channel error LEDs. Table 4 identifies the components associated with each power channel, and the order in which to troubleshoot the components.
 - a. Disconnect the cables and power cords to all internal and external devices. Leave the power-supply cords connected.
 - b. Remove each component that is associated with the LED, one at a time, in the sequence indicated in Table 4, restarting the server each time, until the cause of the overcurrent condition is identified.

Important: Only a trained service technician should remove or replace a FRU, such as a microprocessor or the system board. See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine whether a component is a FRU.

Table 4. Components associated with power-channel error LEDs

Power-channel error LED	Components
A	CD/DVD drive (optical drive), fans, hard disk drives, hard disk drive backplanes
B	PCI riser-card assembly in PCI connector 1 on the system board, DIMMs 1 through 16, microprocessor 2
C	Tape drive if one is installed, SAS riser card assembly, DIMMs 1 through 8, microprocessor 1
D	Microprocessor 1, system board
E	Optional PCI video graphics adapter power cable if one is installed (connector J154 on the system board), optional PCI video graphics adapter if one is installed, PCI riser card assembly in PCI connector 2 on the system board, microprocessor 2
240 V AUX	All PCI adapters and PCI riser-card assemblies, SAS riser card assembly, operator information panel assembly, optional two-port Ethernet card if installed

- c. Replace the identified component.
4. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see “Features and technologies” on page 15 for the minimum configuration).
 5. Reconnect all power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Hard disk drive problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk test).	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic Fixed Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test.

Solving Microprocessor problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The server emits a continuous beep during POST, indicating that the microprocessor is not working correctly.	<ol style="list-style-type: none">1. Correct any errors that are indicated by the LEDs (see “EasyLED Diagnostics” in the <i>Hardware Maintenance Manual</i>).2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed and cache size.3. (Trained service technician only) Make sure that microprocessor 1 is seated correctly.4. Reseat the following components:<ol style="list-style-type: none">a. (Trained service technician only) Microprocessorsb. VRM, if microprocessor 2 is installed5. (Trained service technician only) Replace the microprocessors.

Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:

- Make sure that the correct device drivers, which come with the server, are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
 - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
 - You must use Category 5 cabling.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
 - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
 - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity light is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the Ethernet activity LED on the rear of the server. The Ethernet activity LED is lit when data is active on the Ethernet network. If the Ethernet activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see the *Installation and User Guide*.

Damaged data in CMOS memory or damaged UEFI code can cause undetermined problems. To reset the CMOS data, use the CMOS switch to clear the CMOS memory; see “System-board switches and jumpers” on page 152. If you suspect that the UEFI code is damaged, see “Recovering the UEFI code” on page 134.

Check the LEDs on all the power supplies (see “Power-supply LEDs” on page 50). If the LEDs indicate that the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
 - Any external devices.
 - Surge-suppressor device (on the server).
 - Modem, printer, mouse, and non-IBM devices.
 - Each adapter.
 - Hard disk drives.

- Memory modules. The minimum configuration requirement is 1 GB DIMM per installed microprocessor.
- Service processor (RMM).

The following minimum configuration is required for the server to start:

- One microprocessor
 - One 1 GB DIMM
 - One power supply
 - Power backplane
 - Power cord
 - ServeRAID SAS controller
4. Turn on the server. If the problem remains, suspect the following components in the following order:
- a. Power backplane
 - b. System board

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the riser card.

If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
 - Do diagnostics fail?
 - What, when, where, single, or multiple systems?
 - Is the failure repeatable?
 - Has this configuration ever worked?
 - If it has been working, what changes were made prior to it failing?
 - Is this the original reported failure?
- Diagnostics version
 - Type and version level
- Hardware configuration
 - Print (print screen) configuration currently in use
 - UEFI level
- Operating system software
 - Type and version level

Note: To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same UEFI level
3. Have the same adapters/attachments in the same locations

4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software setup between “working” and “non-working” systems will often lead to problem resolution.

Calling IBM for service

When you call for service, have as much of the following information available as possible:

- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
 - Does the server fail the diagnostic programs? If so, what are the error codes?
 - What occurs? When? Where?
 - Is the failure repeatable?
 - Has the current server configuration ever worked?
 - What changes, if any, were made before it failed?
 - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- UEFI code level
- Operating-system type and version level

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the servers:

- Machine type and model
- UEFI level
- Memory amount, type, and configuration
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

Chapter 6. Removing and installing FRUs

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by Trained service technicians.

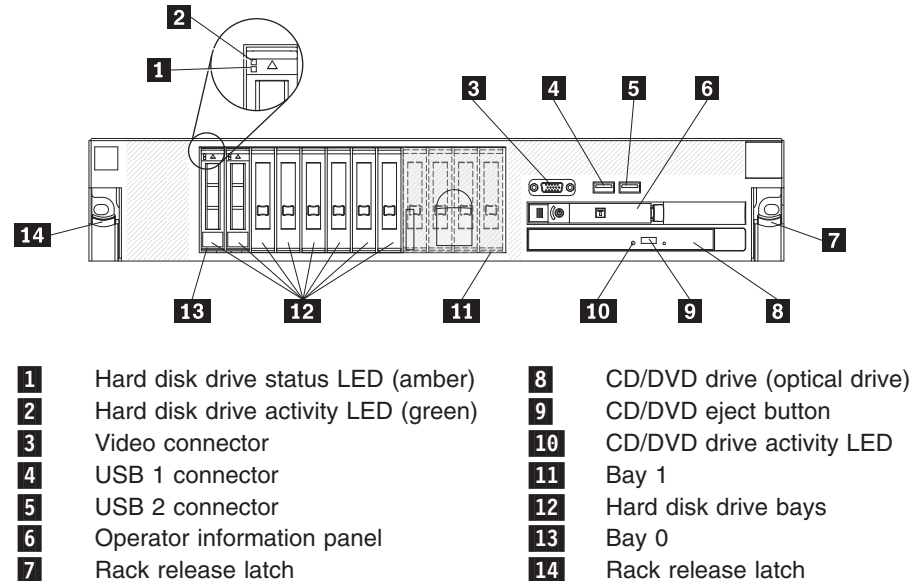
See Chapter 7, “Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798,” on page 231 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

Locations

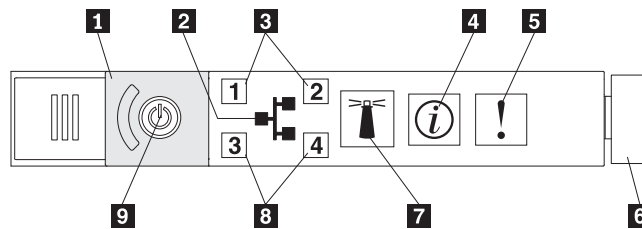
Front view

The following illustration shows the controls, light-emitting diodes (LEDs), and connectors on the front of the server.



Operator information panel

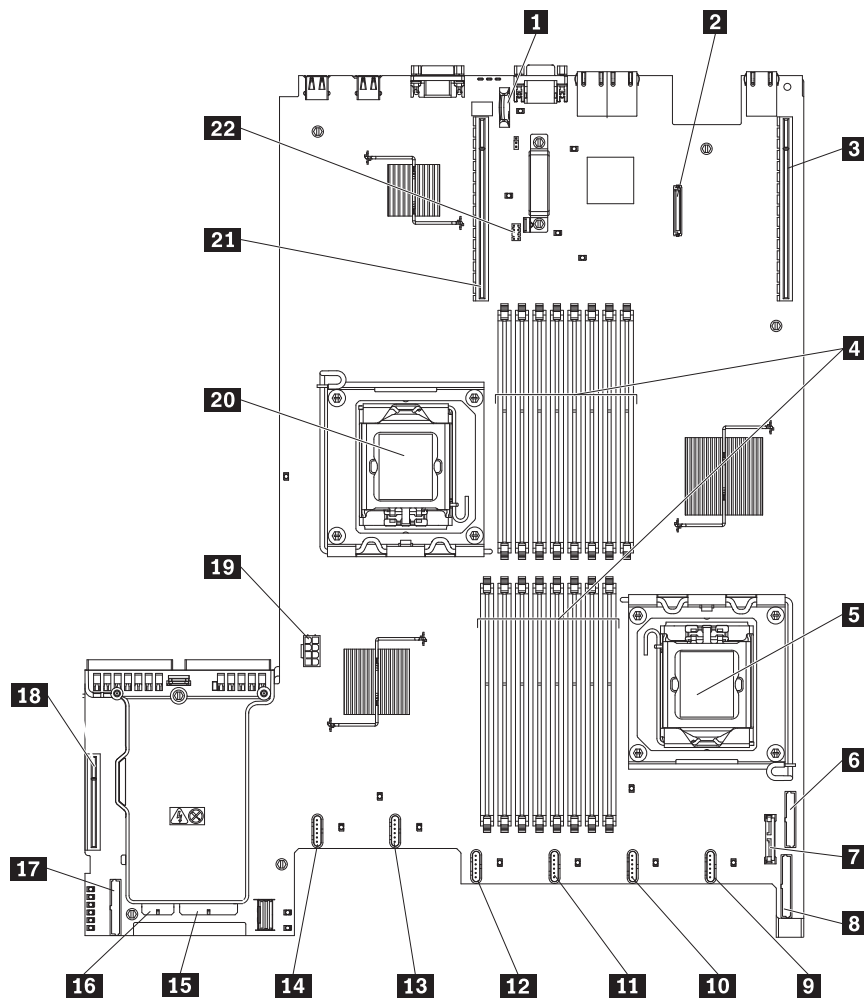
The following controls, LEDs, and connectors are on the operator information panel:



- | | | | |
|----------|----------------------------|----------|-----------------------------------|
| 1 | Power-control button cover | 6 | Release latch |
| 2 | Ethernet icon LED | 7 | Locator button/locator LED |
| 3 | Ethernet activity LEDs | 8 | Ethernet activity LEDs |
| 4 | Information LED | 9 | Power-control button/power-on LED |
| 5 | System-error LED | | |

System-board internal connectors

The following illustration shows the internal connectors on the system board.

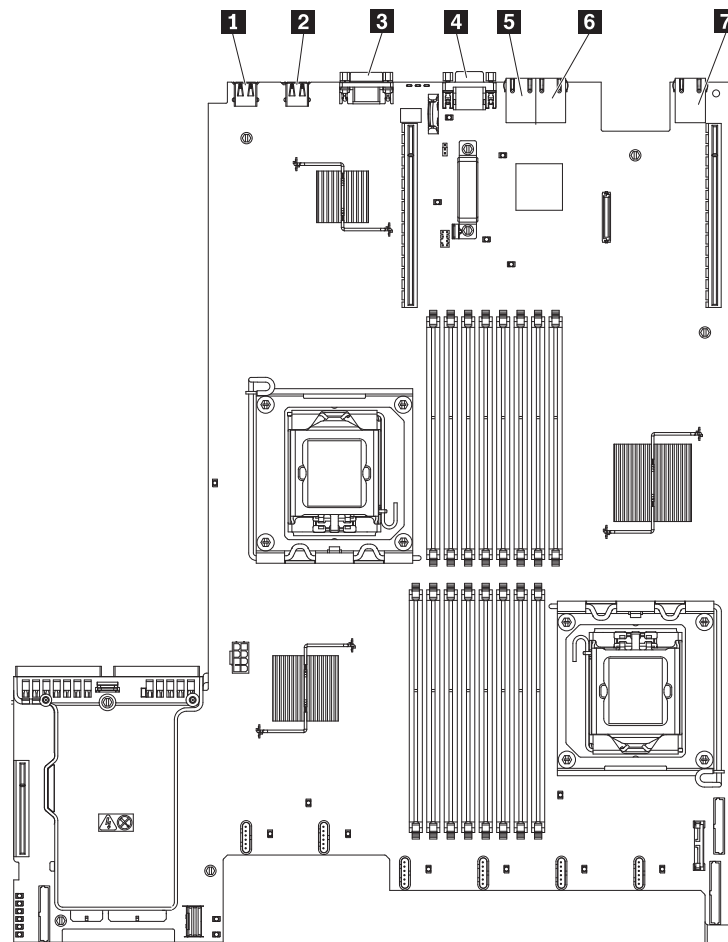


- | | | | |
|----------|---------|-----------|-----------------|
| 1 | Battery | 12 | Fan connector 2 |
|----------|---------|-----------|-----------------|

2	Optional two-port Ethernet card connector	13	Reserved
3	PCI riser connector 1	14	Fan connector 3
4	DIMM connectors	15	Hot-swap SAS/SATA power connector backplane 1 and 2
5	Microprocessor 1	16	Hot-swap SAS/SATA power connector optional backplane 3
6	Operator information panel connector	17	Hot-swap SAS/SATA configuration cable connector
7	Optical drive connector	18	SAS riser-card connector
8	Front video/USB connector	19	Auxiliary power for PCI Express graphics adapter connector
9	Reserved	20	Microprocessor 2
10	Fan connector 1	21	PCI riser connector 2
11	Reserved	22	Virtual media key connector

System-board external connectors

The following illustration shows the external input/output connectors on the system board.



1	USB connector 4
2	USB connector 3
3	Serial connector

- 4** Video connector
- 5** Ethernet connector 2
- 6** Ethernet connector 1
- 7** Systems management Ethernet connector

System-board switches and jumpers

Any switches or jumpers on the system board that are not shown in the illustration are reserved. See the section about recovering the unified extensible firmware interface (UEFI) code in the *Hardware Maintenance Manual* for information about using the UEFI boot recovery jumper.

The following illustration shows the switches and jumpers on the system board.

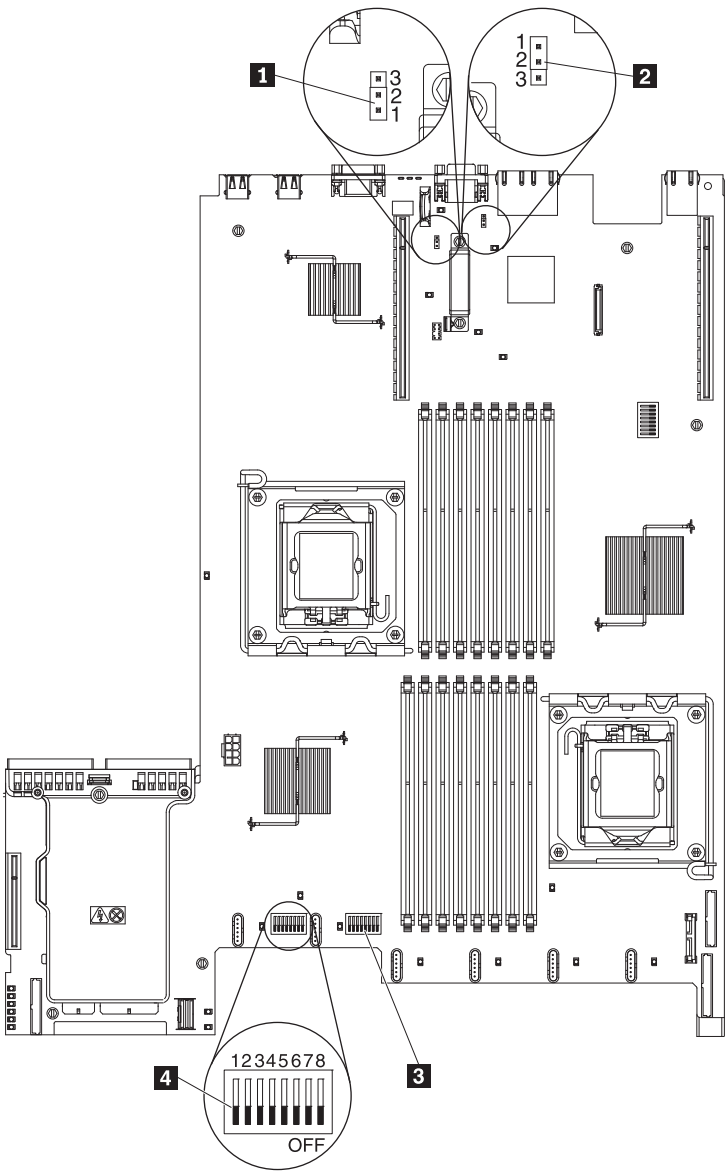


Table 5. Callout descriptions

Jumper name	Jumper setting
-------------	----------------

Table 5. Callout descriptions (continued)

1	UEFI boot recovery jumper (J29)	<ul style="list-style-type: none"> • Pins 1 and 2: Normal (default) Loads the primary server firmware (formerly called BIOS) ROM page. • Pins 2 and 3: Loads the secondary (backup) server firmware ROM page.
2	IMM recovery jumper (J147)	<ul style="list-style-type: none"> • Pins 1 and 2: Normal (default) Loads the primary IMM firmware ROM page. • Pins 2 and 3: Loads the secondary (backup) IMM firmware ROM page.
3	SW4 switch block (reserved)	
4	SW3 switch block	
Notes: <ol style="list-style-type: none"> 1. If no jumper is present, the server responds as if the pins are set to 1 and 2. 2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem. 		

Table 6 describes the function of each switch on the switch block.

Table 6. Switch block 3, switches 1 - 8

Switch number	Default value	Switch description
8	Off	Reserved.
7	Off	Reserved.
6	Off	Reserved.
5	Off	<p>Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Setup utility so that you can change or delete the power-on password. You do not have to move the switch back to the default position after the password is overridden.</p> <p>Changing the position of this switch does not affect the administrator password check if an administrator password is set.</p>
4	Off	Reserved.
3	Off	Reserved.
2	Off	Reserved.
1	Off	Reserved.Clear

Clear CMOS. When this switch is toggled to On, it clears the CMOS data, which clears the power-on password.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. (Review the information in Chapter 2, "Safety information," on page 3, "Installing optional devices and replacing FRUs" on page 156, and "Turning off the server" on page 53.)
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.

Note: Error LEDs remain lit only while the server is connected to power.

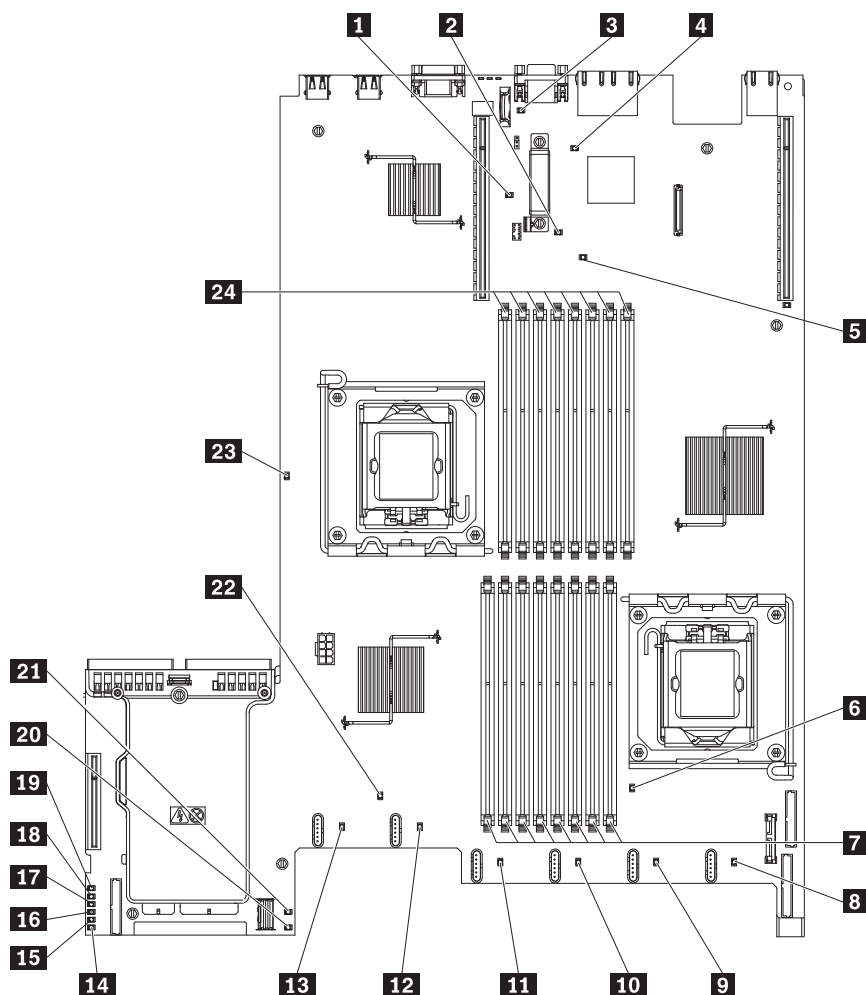


Table 7. Callout descriptions

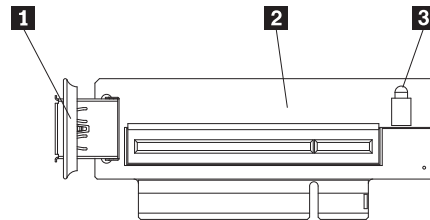
1	PCI riser 2 LED	13	Fan 3 error LED
2	Enclosure manager heartbeat LED	14	Power channel A LED
3	Battery error LED	15	Power channel B LED
4	IMM heartbeat LED	16	Power channel C error LED
5	PCI riser 1 LED	17	Power channel D error LED
6	Microprocessor 1 error LED	18	Power channel E error LED
7	DIMMs 1 - 8 error LEDs	19	Power channel F error LED
8	Reserved	20	240 - V AUX channel error LED
9	Fan 1 error LED	21	SAS riser missing LED
10	Reserved	22	System-board error LED
11	Fan 2 error LED	23	Microprocessor 2 error LED
12	Reserved	24	DIMMs 9-16 error LEDs

SAS riser-card connectors and LEDs

The following illustrations show the connectors and LEDs on the SAS riser cards.

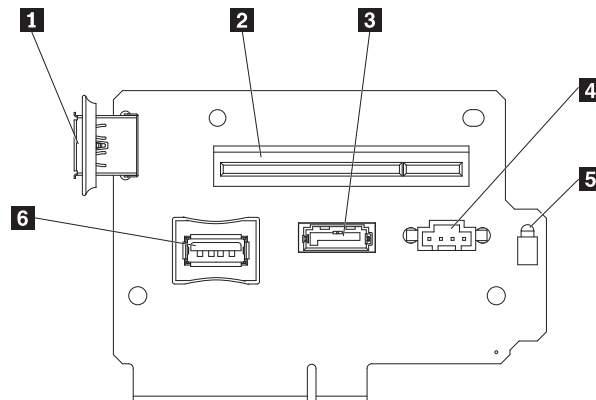
Note: Error LEDs remain lit only while the server is connected to power.

A 12-drive-capable model server or a diskless model server contains the following riser card:



- 1** USB connector
- 2** PCI Express RAID adapter
- 3** SAS error LED

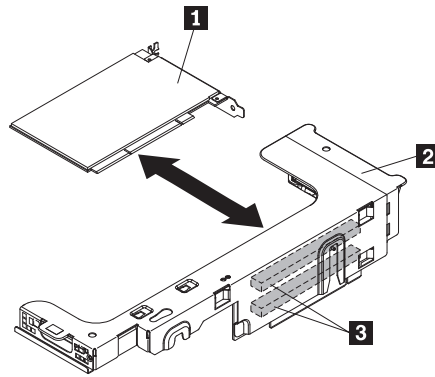
A tape-enabled model server contains the following riser card:



- 1** USB connector
- 2** PCI Express RAID adapter
- 3** SATA tape signal
- 4** Tape power
- 5** SAS error LED
- 6** USB tape

PCI riser-card adapter connectors

The following illustration shows the connectors on the PCI riser card for user-installable PCI adapters.

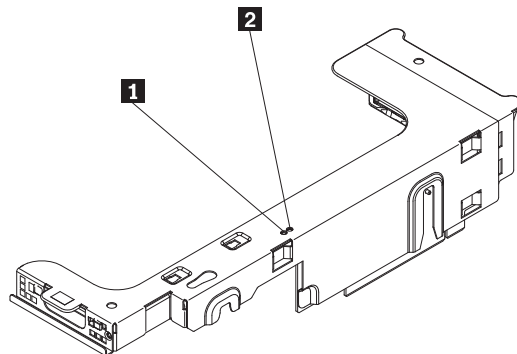


- 1** Adapter
- 2** PCI riser-card assembly
- 3** Adapter connectors

PCI riser-card assembly LEDs

The following illustration shows the light-emitting diodes (LEDs) on the PCI riser-card assembly.

Note: Error LEDs remain lit only while the server is connected to power.



- 1** Lower PCI slot error LED
- 2** Upper PCI slot error LED

Installing optional devices and replacing FRUs

This chapter provides hardware installation and replacement procedures for customer replaceable units.

Major components of the server

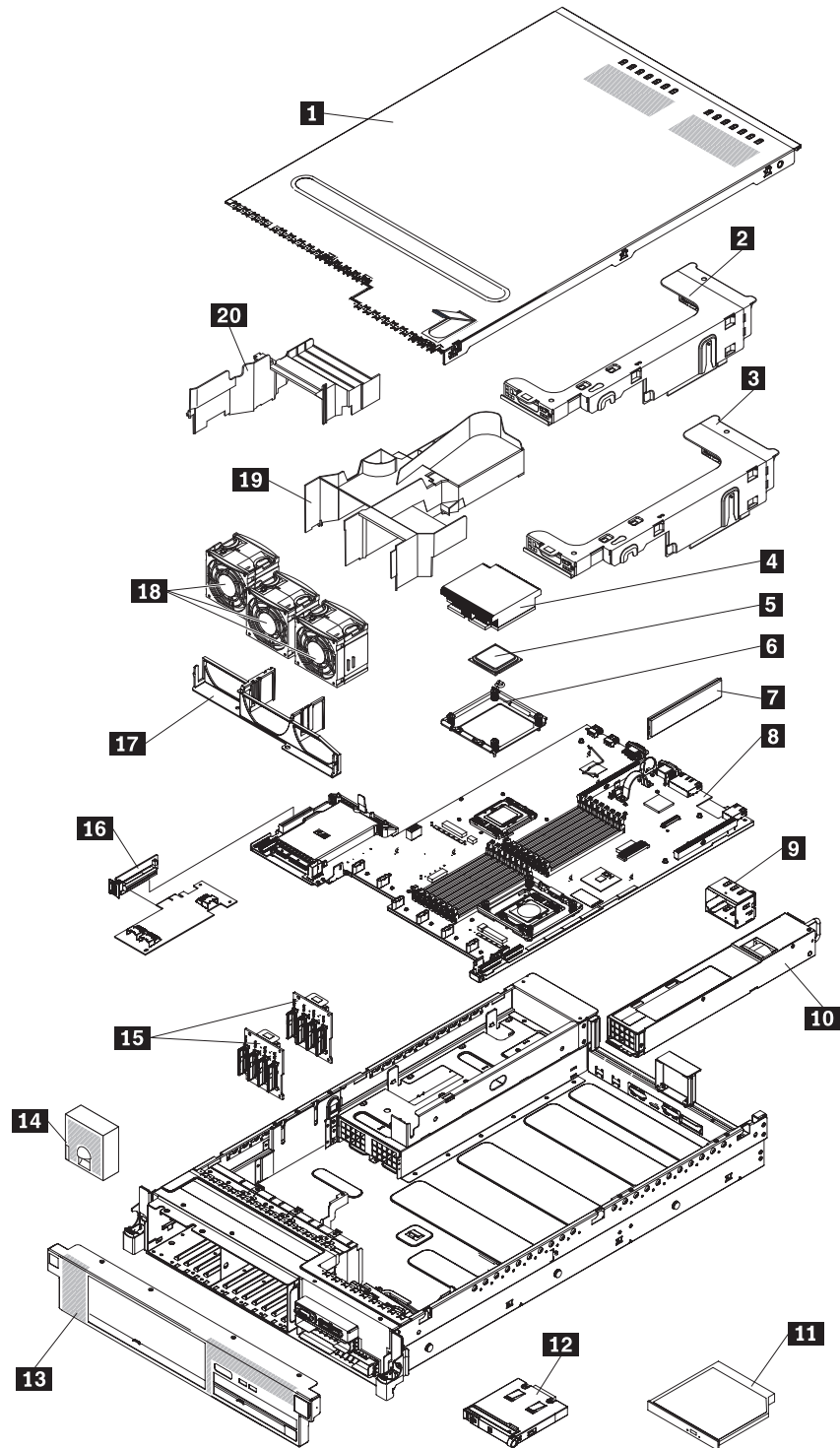
Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap

components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustrations show the major components in the server.

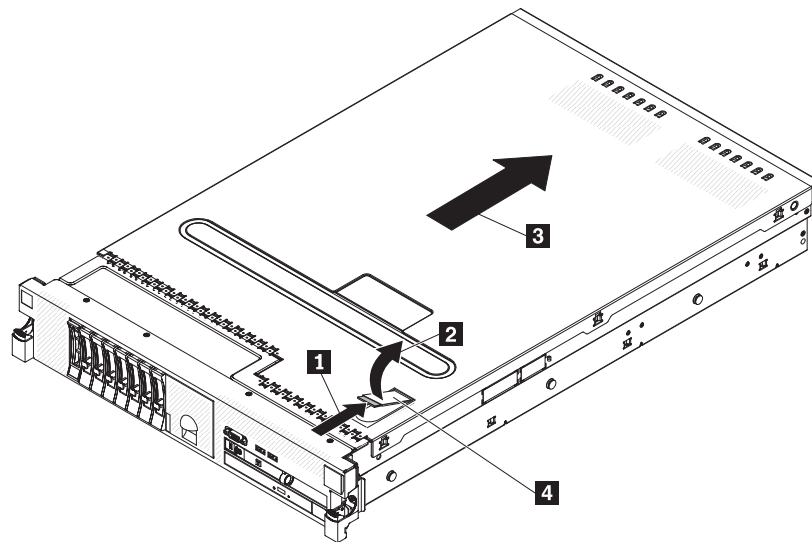
Note: The illustrations in this document might differ slightly from your hardware.



1	Cover	11	CD/DVD drive
2	PCI riser-card assembly	12	Operator information panel
3	PCI riser-card assembly	13	Front bezel (some models)
4	Heat sink	14	4-drive filler panel
5	Microprocessor	15	SAS hard disk drive backplanes
6	Heat-sink retention module	16	SAS riser card
7	DIMM	17	Fan bracket
8	System board	18	Fans
9	Power-supply filler panel	19	DIMM air baffle
10	Power supply	20	Microprocessor 2 air baffle

Removing the cover

The following illustration shows how to remove the cover.



Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see the “Diagnosing a problem” on page 21 for diagnostic information.

To remove the cover, complete the following steps:

1. Read the safety information in the *Installation and User Guide* document.
2. If you are planning to view the error LEDs that are on the system board and components, leave the server connected to power and go directly to step 4.
3. If you are planning to install or remove a microprocessor, memory module, PCI adapter, battery, or other non-hot-swap optional device, turn off the server and all attached devices and disconnect all external cables and power cords (see “Turning off the server” on page 53).
4. Press down on the left and right side latches and pull the server out of the rack enclosure until both slide rails lock.

Note: You can reach the cables on the rear of the server when the server is in the locked position.

5. Press the blue latch **1** on the end of the cover-release latch **4** and lift the cover-release latch **2**. Slide the cover forward **3** and lift the cover off the server. Set the cover aside.

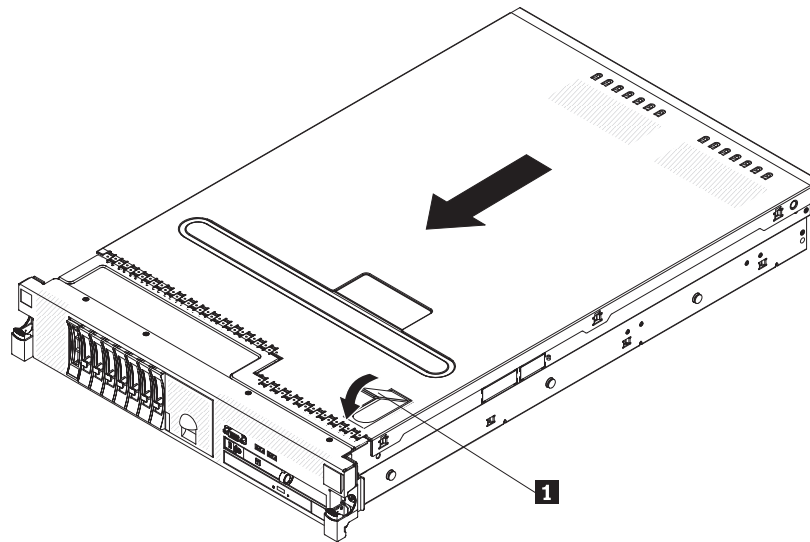
Attention: For proper cooling and airflow, replace the cover before you turn on the server. Operating the server for extended periods of time (over 30 minutes) with the cover removed might damage server components.

Installing the server cover

Attention: For proper cooling and airflow, install the server cover before you turn on the server.

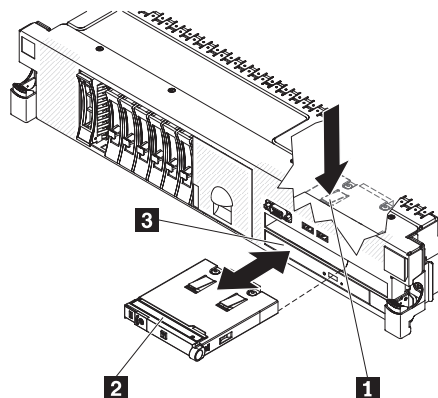
To install the server cover, complete the following steps:

1. Align the cover over the server until the cover edges slip in position over the chassis.
2. Press down the cover-release latch **1** on the front of the cover, while sliding the cover forward toward the front of the server until the cover is completely closed.



Removing the operator information panel assembly

To remove the operator information panel **2** assembly, complete the following steps.

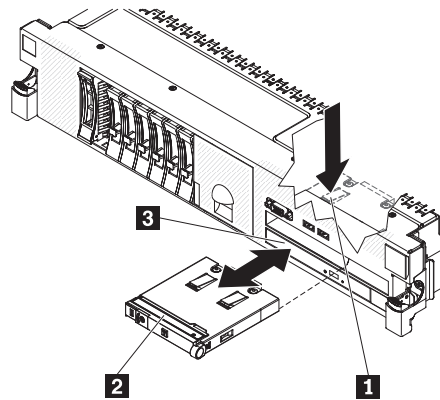


1. Remove the cover.

2. Disconnect the cable from the back of the operator-information panel **2** assembly.
3. Reach inside the server and press the release tab; then, while holding the release tab down, push the assembly toward the front of the server.
4. From the front of the server, carefully pull the operator information panel assembly out of the server.
5. If you are instructed to return the operator information panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the operator information panel assembly

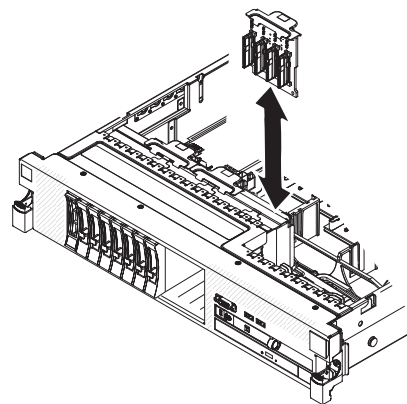
To install the replacement operator information panel assembly, complete the following steps.



1. Slide the operator information panel assembly into the server until it clicks into place.
2. Inside the server, connect the cable to the rear of the operator information panel assembly.
3. Install the cover (see “Installing the server cover” on page 160).
4. Slide the server into the rack.
5. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing a SAS hard disk drive backplane

To remove a SAS hard disk drive backplane, complete the following steps.

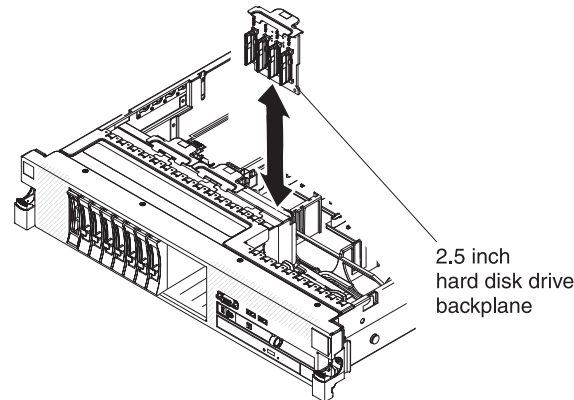


1. Read the safety information that begins on page 3.

2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Slide the server out of the rack.
4. Remove the cover (see “Removing the cover” on page 159).
5. Pull the hard disk drives out of the server slightly to disengage them from the backplane. See “Removing a hot-swap hard disk drive” on page 211 for details.
6. To obtain more working room, remove the fans and the fan bracket (see “Removing a hot-swap fan” on page 196 and “Removing the fan bracket” on page 198).
7. Disconnect the backplane cables.
8. Lift the backplane out of the server by pulling it toward the rear of the server, then lifting it up.
9. If you are instructed to return the backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a SAS hard disk drive backplane

To install the replacement SAS hard disk drive backplane, complete the following steps.



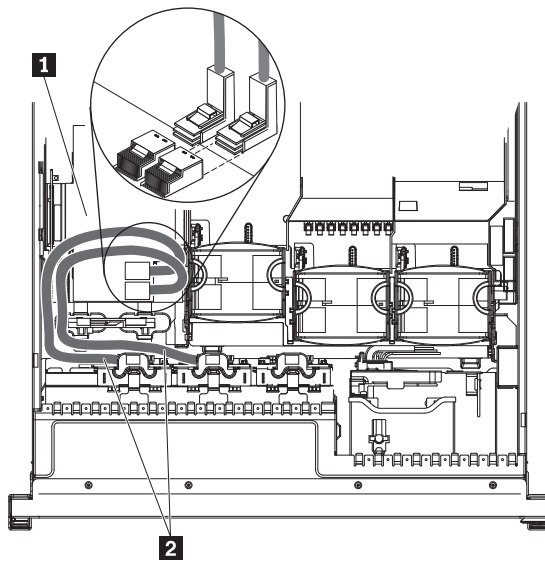
1. Connect the power and signal cables to the replacement backplane.
2. Align the backplane with the backplane slot in the chassis and the small slots on top of the hard disk drive cage.
3. Lower the backplane into the slots on the chassis.
4. Rotate the top of the backplane until the front tab clicks into place into the latches on the chassis.
5. Insert the hard disk drives the rest of the way into the bays.
6. Replace the fan bracket and fans if you removed them (see "Installing the fan bracket" on page 200 and "Installing a hot-swap fan" on page 197).
7. Install the cover (see "Installing the server cover" on page 160).
8. Slide the server into the rack.
9. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Internal cable routing and connectors

The following illustration shows the internal routing and connectors for the two SAS signal cables (in server models with eight SAS drive bays).

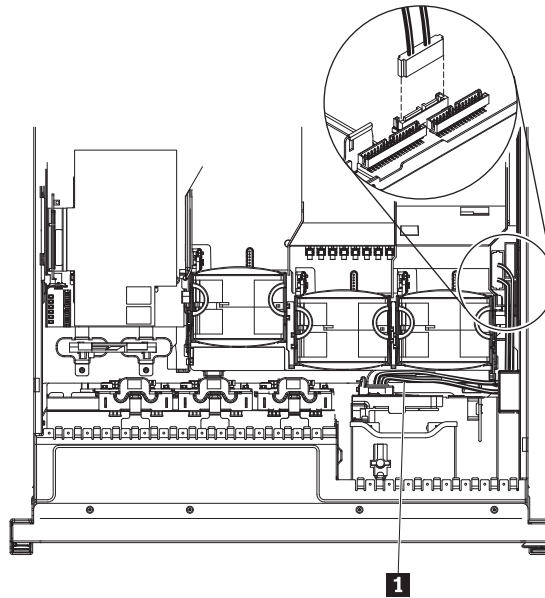
Notes:

1. To connect the SAS signal cables, make sure that you first connect the signal cable, and then the power cable and signal cable.
2. To disconnect the SAS signal cables, make sure that you first disconnect the power cable, and then the signal cable and configuration cable.

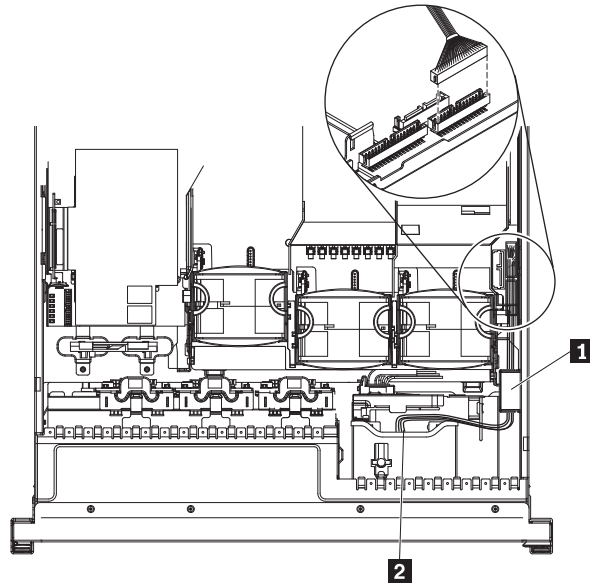


- 1** ServeRAID- MR10i SAS/SATA controller
- 2** SAS signal cables

The SATA cable is a combination power and signal cable with a shared connector on both ends. The following illustration shows the internal routing and connector for the SATA cable **1**.



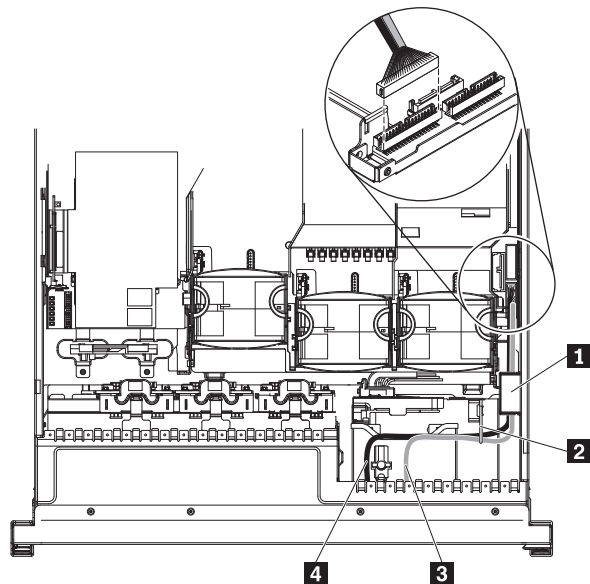
The following illustration shows the internal routing and connector for the operator information panel cable.



- 1** Top cover latch receptacle
- 2** Operator panel cable

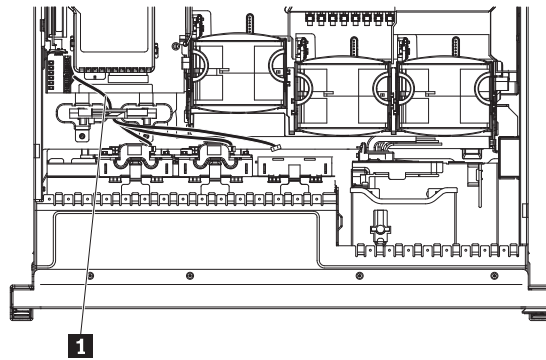
The following illustration shows the internal routing and connector for the USB/video cable.

Note: The USB cable is routed under the video cable and then both the USB and video cables are routed under the cable retention tab and the top cover latch receptacle.

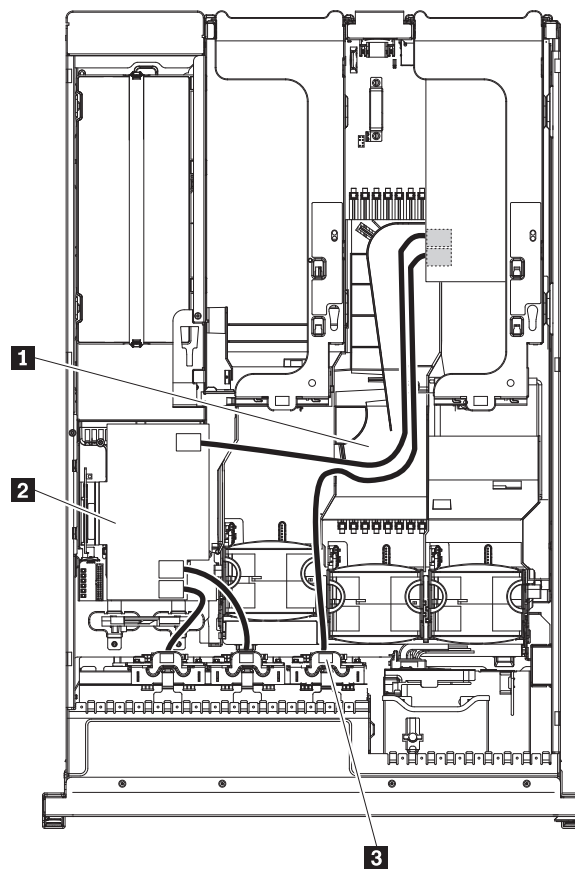


- 1** Top cover latch receptacle
- 2** Cable retention tab
- 3** Video cable
- 4** USB cable

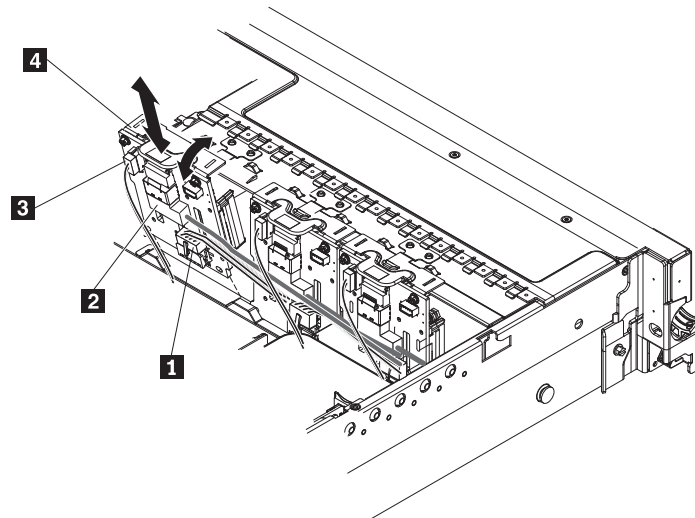
The following illustration shows the internal routing for the configuration cable (3 backplane connectors) **1**.



The following illustrations show the internal routing for the SAS hard disk drive backplane cables.



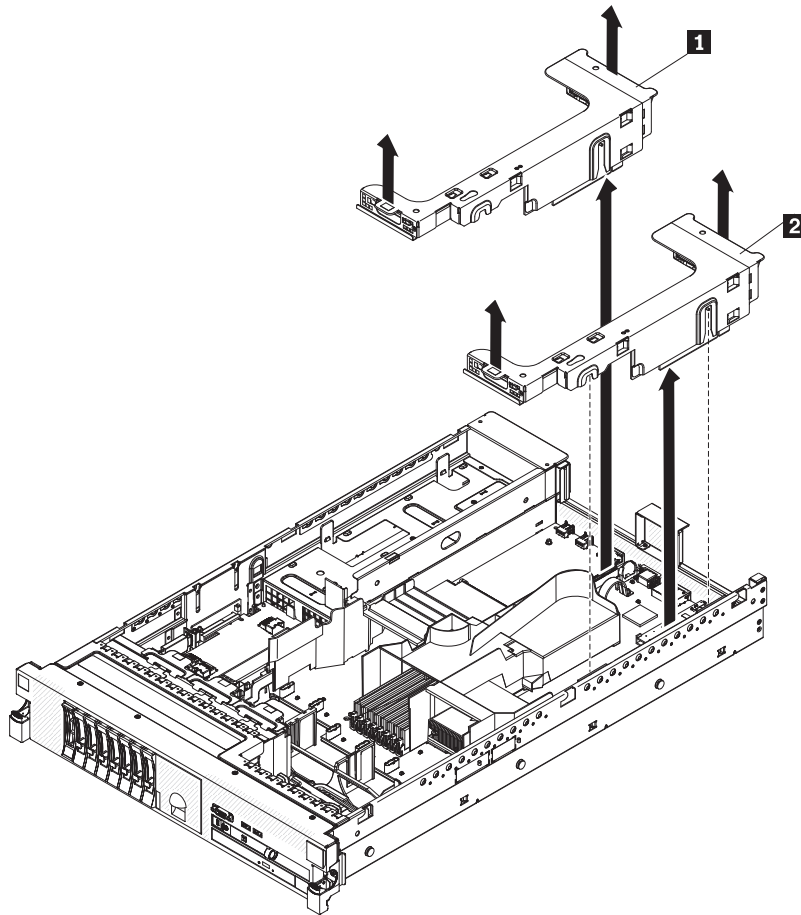
- 1** DIMM air baffle
- 2** SAS expander card
- 3** New backplane



- 1** Power cable
- 2** SAS signal cable
- 3** Configuration cable
- 4** Hard disk drive backplane

Removing a PCI riser-card assembly

The server comes with two riser-card assemblies that each contain two PCI Express x8 connectors. You can replace a PCI Express riser-card assembly with a riser-card assembly that contains one PCI Express Gen 2 x16 connector. See <http://www.lenovo.com/thinkserver> for a list of riser-card assemblies that you can use with the server.



- 1** PCI riser-card assembly 2
- 2** PCI riser-card assembly 1

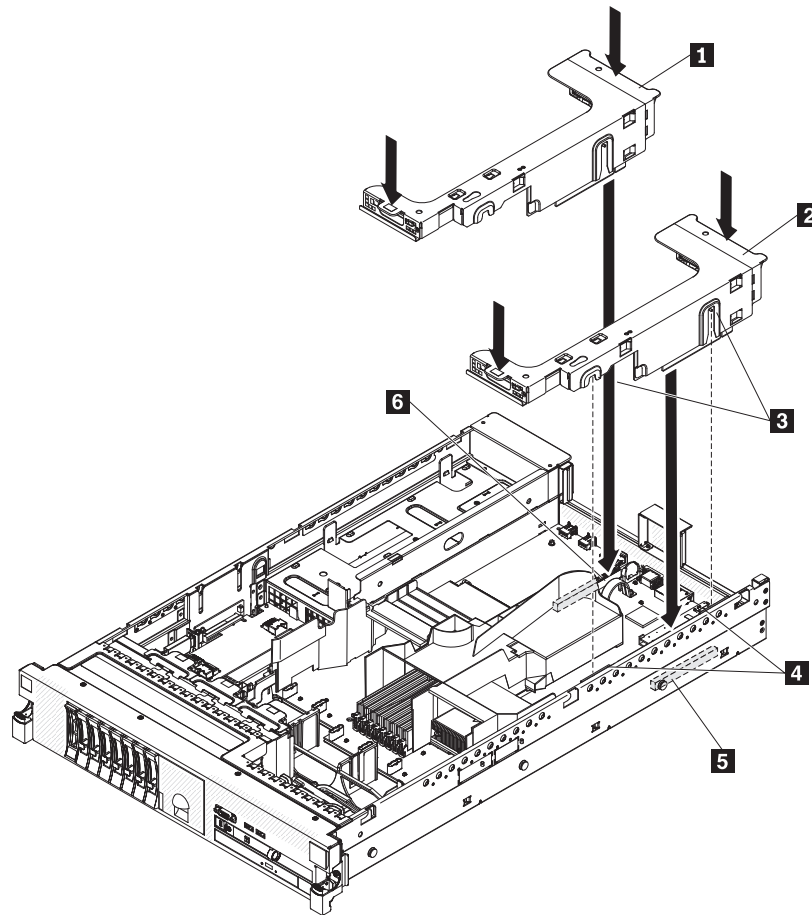
To remove the riser-card assembly, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
3. Slide the server out of the rack.
4. Remove the cover (see “Removing the cover” on page 159).
5. Grasp the assembly at the front tab and rear edge and lift it to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.

Installing a PCI riser-card assembly

To install a PCI riser-card assembly, complete the following steps.

Note: The illustrations in this document might differ slightly from your hardware.



- | | |
|----------|---------------------------|
| 1 | PCI riser-card assembly 2 |
| 2 | PCI riser-card assembly 1 |
| 3 | Alignment slots |
| 4 | Alignment brackets |
| 5 | PCI riser connector 1 |
| 6 | PCI riser connector 2 |

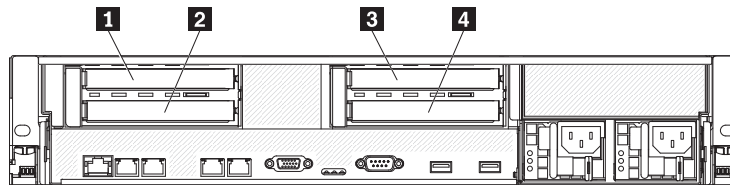
1. Read the safety information that begins on page 3.
2. Make sure that the server and all peripheral devices are turned off and that the power cords and all external cables are disconnected.
3. Reinstall any adapters and reconnect any internal cables that you removed in other procedures (see “Internal cable routing and connectors” on page 163).
4. Align the PCI riser-card assembly with the selected PCI riser connector on the system board:
 - PCI riser connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets in the side of the chassis.
 - PCI riser connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the PCI riser connector on the system board.
5. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.

If you have other optional devices to install, do so now. Otherwise, go to “Completing the installation” on page 227.

Removing a PCI adapter from a PCI riser-card assembly

This topic describes removing an adapter from a PCI expansion slot in a PCI riser-card assembly. These instructions apply to PCI adapters such as video graphic adapters and network adapters. To remove a SAS controller from the SAS riser card, go to “Removing a SAS controller from the SAS riser card” on page 203.

The following illustration shows the locations of the adapter expansion slots from the rear of the server.

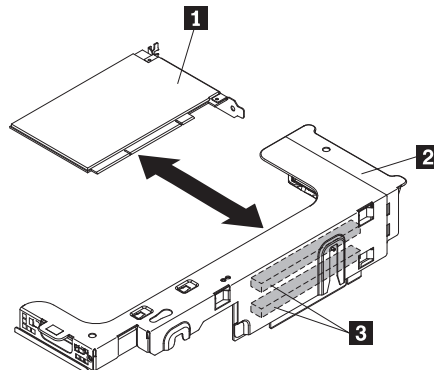


- 1** PCI slot 1
- 2** PCI slot 2
- 3** PCI slot 3
- 4** PCI slot 4

Notes:

1. If a PCI Express Gen 2x16 adapter is installed in a PCI riser-card assembly, the second expansion slot is not available.
2. If you are replacing a high power graphics adapter, you might need to disconnect the internal power cable from the system board before removing the adapter.

To remove an adapter from a PCI expansion slot, complete the following steps.



- 1** Adapter
- 2** PCI riser-card assembly
- 3** Adapter connectors

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Press down on the left and right side latches and slide the server out of the rack enclosure until both slide rails lock; then, remove the cover (see “Removing the cover” on page 159).

4. Remove the PCI riser-card assembly that contains the adapter (see “Removing a PCI riser-card assembly” on page 167).
 - If you are removing an adapter from PCI expansion slot 1 or 2, remove PCI riser-card assembly 1.
 - If you are removing an adapter from PCI expansion slot 3 or 4, remove PCI riser-card assembly 2.
5. Disconnect any cables from the adapter (make note of the cable routing, in case you reinstall the adapter later).
6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI expansion slot.
7. If the adapter is a full-length adapter in the upper expansion slot of the PCI riser-card assembly and you do not intend to replace it with another full-length adapter, remove the full-length-adapter bracket and store it on the underside of the top of the PCI riser-card assembly.
8. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a PCI adapter in a PCI riser-card assembly

To ensure that a ServeRAID-10i, ServeRAID-10is, or ServeRAID-10M adapter works correctly in your server, make sure that the adapter firmware is at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

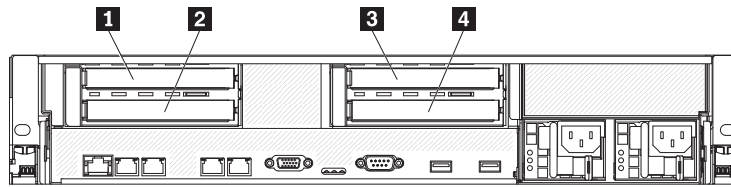
Some high end video adapters are supported by your server. See <http://www.lenovo.com/thinkserver> for more information.

Notes:

1. If you are installing a video adapter in your server, do not set the maximum digital video resolution above 1600 x 1200 at 60 Hz for an LCD monitor. This is the highest resolution supported for any video adapter in this server.
2. Any high-definition video-out connector or stereo connector on the video adapter is not supported.

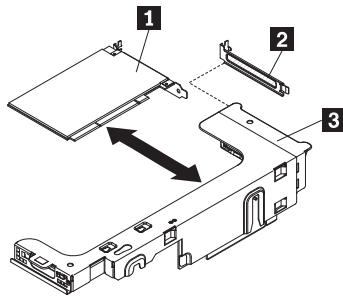
These instructions apply to PCI adapters such as video graphics adapters and network adapters. To install a SAS controller, go to “Installing a SAS controller on the SAS riser card” on page 204.

The following illustration shows the locations of the adapter expansion slots from the rear of the server.



- 1** PCI slot 1
- 2** PCI slot 2
- 3** PCI slot 3
- 4** PCI slot 4

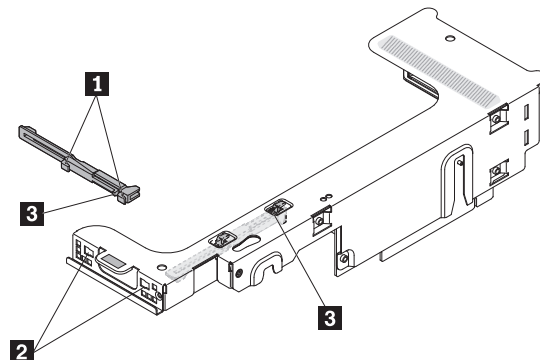
To install an adapter, complete the following steps.



- 1** Adapter
- 2** Expansion-slot cover
- 3** PCI riser-card assembly

1. Install the adapter in the expansion slot.

- a. If the adapter is a full-length adapter for the upper expansion slot (1 or 3) in the riser card, remove the full-length-adapter bracket **1** from underneath the top of the riser-card assembly and insert it in the two openings **2** in the end of the upper expansion slot of the riser-card assembly.



- b. Press the bracket tab **3** and slide the bracket to the right until it clicks into place.
- c. Align the adapter with the PCI connector on the riser card and the guide on the external end of the riser-card assembly.
- d. Press the adapter firmly into the PCI connector on the riser card.

2. Connect any required cables to the adapter (see “Internal cable routing and connectors” on page 163.)

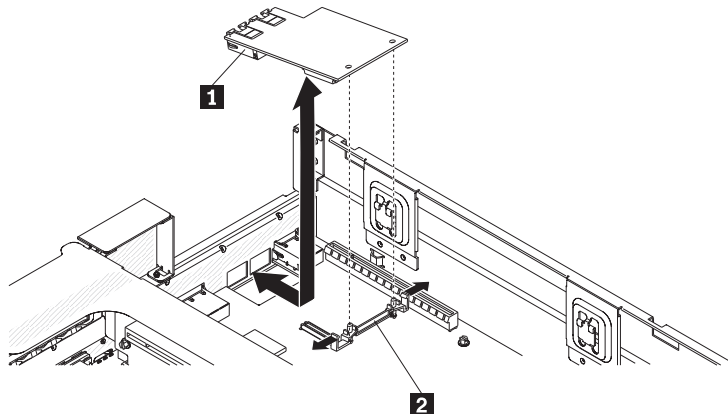
Attention:

- When you route cables, do not block any connectors or the ventilated space around any of the fans.
 - Make sure that cables are not routed on top of components under the PCI riser-card assembly.
 - Make sure that cables are not pinched by the server components.
3. Align the PCI riser-card assembly with the selected PCI connector on the system board:
 - PCI-riser connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets on the side of the chassis; align the rear of the assembly with the guides on the rear of the server.
 - PCI-riser connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the riser-card connector on the system board; align the rear of the assembly with the guides on the rear of the server.
 4. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the riser-card connector on the system board.
 5. Perform any configuration tasks that are required for the adapter.
 6. Install the server cover (see “Completing the installation” on page 227).
 7. Slide the server into the rack.
 8. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing an Ethernet adapter

To remove an Ethernet adapter, complete the following steps:

1. Read the safety information that begins on page 3 and “Installation guidelines” on page 11.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover.
4. Remove the PCI riser card 1.
5. Push the tabs on the adapter bracket **2** outwards, then lift the front end of the adapter **1** to disconnect it from the system board. Then lift it out of the server.



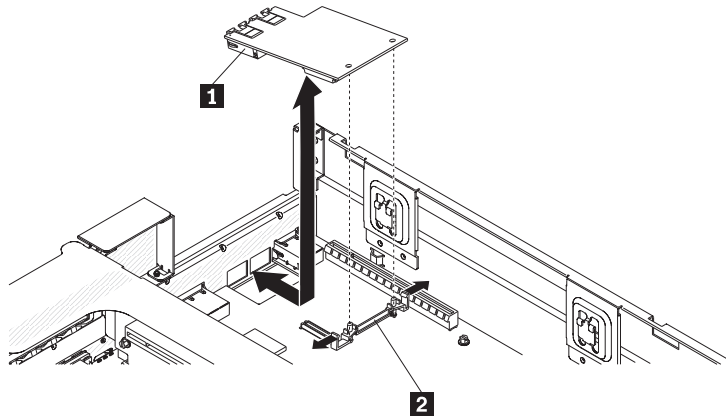
6. Install the cover.

7. Turn on the server and reconnect the peripheral devices, power cords, and external cables.

Installing an Ethernet adapter

To install an Ethernet adapter, complete the following steps:

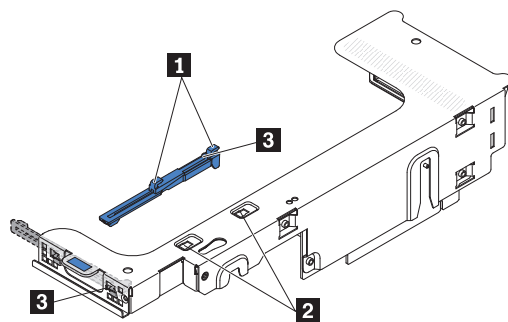
1. Remove the adapter bracket **2** from the new Ethernet adapter **1**.
2. Extend the Ethernet ports through the openings in the rear of the chassis.



3. Press down on the adapter above the connector and adapter bracket.
4. Install PCI riser 1.
5. Install the cover.
6. Turn on the server and reconnect the peripheral devices, power cords, and external cables.

Storing the full-length-adapter bracket

If you are removing a full-length adapter in the upper riser-card PCI slot and will replace it with a shorter adapter or no adapter, you must remove the full-length-adapter bracket from the end of the riser-card assembly and return the bracket to its storage location.

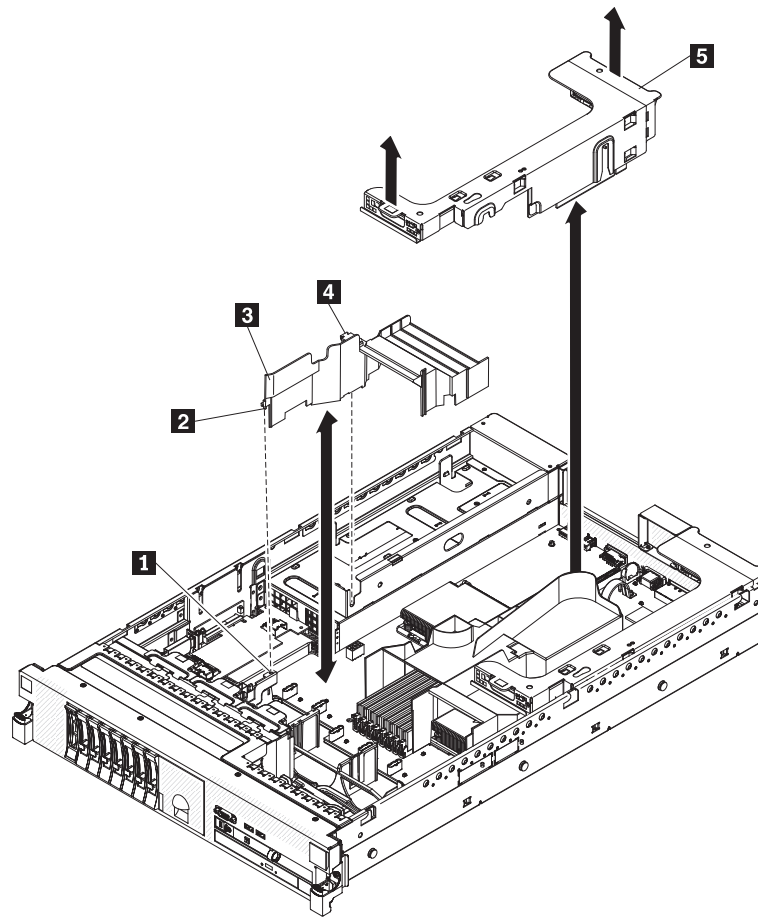


To remove and store the full-length-adapter bracket, complete the following steps:

1. Press the bracket tab **3** and slide the bracket to the left until the bracket falls free of the riser-card assembly.
2. Align the bracket with the storage location on the riser-card assembly as shown.
3. Place the two hooks **1** in the two openings **2** in the storage location on the riser-card assembly.
4. Press the bracket tab **3** and slide the bracket toward the expansion-slot-opening end of the assembly until the bracket clicks into place.

Removing the microprocessor 2 air baffle

When you work with some optional devices, you must first remove the microprocessor 2 air baffle to access certain components. The following illustration shows how to remove the microprocessor 2 air baffle.



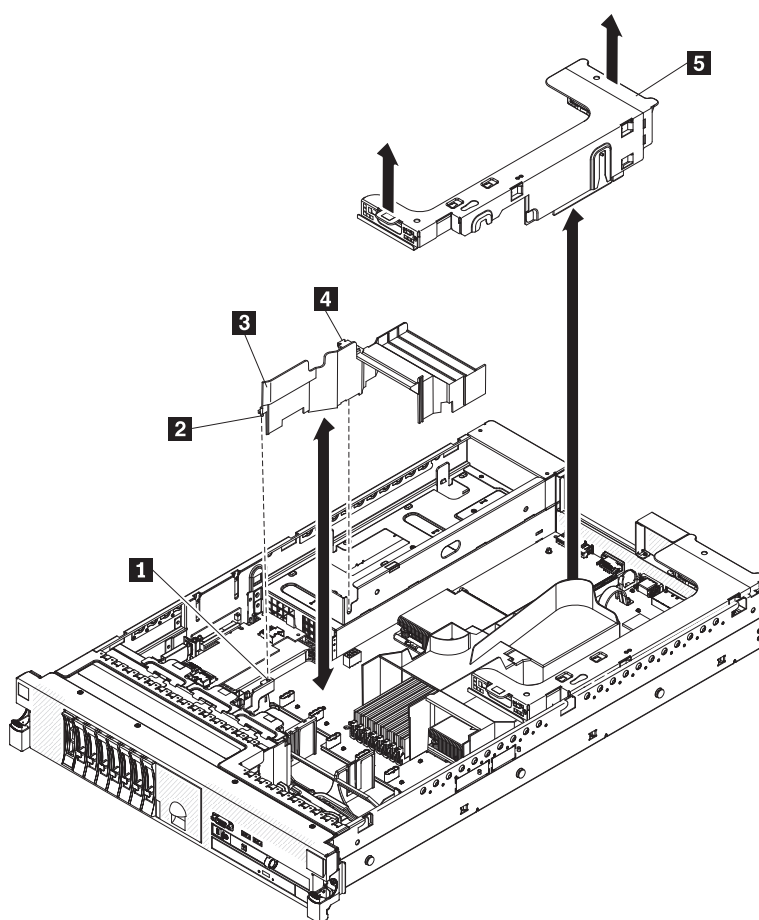
- | | |
|----------|-----------------------------|
| 1 | Hole |
| 2 | Pin |
| 3 | Microprocessor 2 air baffle |
| 4 | Tab |
| 5 | PCI riser-card assembly 2 |

To remove the microprocessor 2 air baffle, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Remove the cover.
4. Remove PCI riser-card assembly 2 (see “Removing a PCI riser-card assembly” on page 167).
5. Grasp the top of the air baffle and lift the air baffle out of the server.

Attention: For proper cooling and airflow, replace all air baffles before you turn on the server. Operating the server with any air baffle removed might damage server components.

Installing the microprocessor 2 air baffle



- | | |
|----------|-----------------------------|
| 1 | Hole |
| 2 | Pin |
| 3 | Microprocessor 2 air baffle |
| 4 | Tab |
| 5 | PCI riser-card assembly 2 |

To install the microprocessor 2 air baffle, complete the following steps:

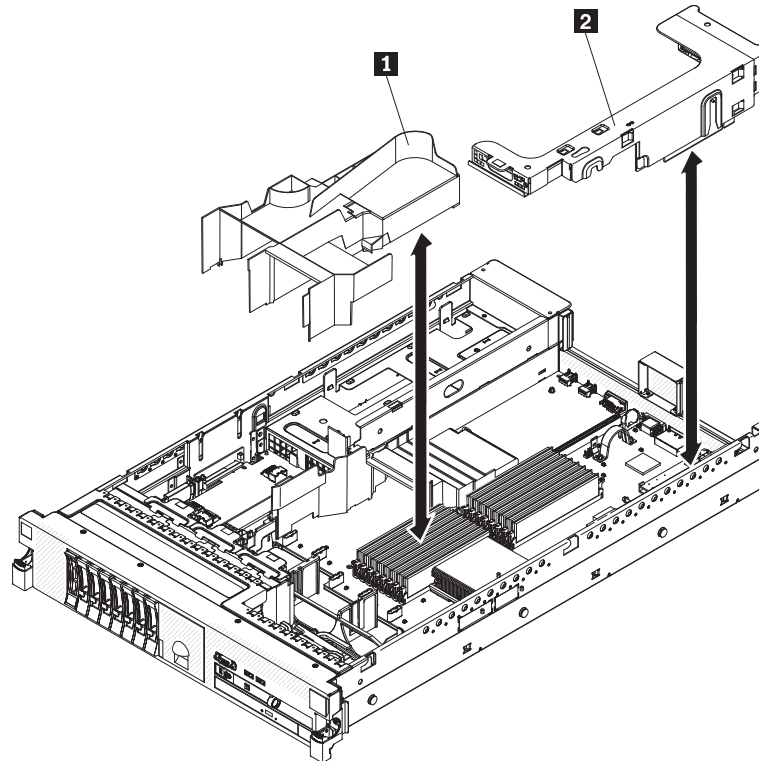
1. Read the safety information that begins on page 3.
2. Make sure that the server and peripheral devices are turned off (see “Turning off the server” on page 53) and that all power cords and external cables are disconnected.
3. Remove the cover (see “Removing the cover” on page 159).
4. Align the tab on the left side of the microprocessor 2 air baffle with the slot in the right side of the power-supply cage.
5. Align the pin on the bottom of the microprocessor air baffle with the hole on the system board retention bracket.
6. Lower the microprocessor 2 air baffle into the server, making sure all cables are out of the way.

Attention: For proper cooling and airflow, replace all air baffles before you turn on the server. Operating the server with any air baffle removed might damage server components.

7. Install PCI riser-card assembly 2.
8. Install the cover (see “Completing the installation” on page 227).
9. Slide the server into the rack.
10. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the DIMM air baffle

When you work with some optional devices, you must first remove the DIMM air baffle to access certain components or connectors on the system board. The following illustration shows how to remove the DIMM air baffle.



- | | |
|----------|---------------------------|
| 1 | DIMM air baffle |
| 2 | PCI riser-card assembly 1 |

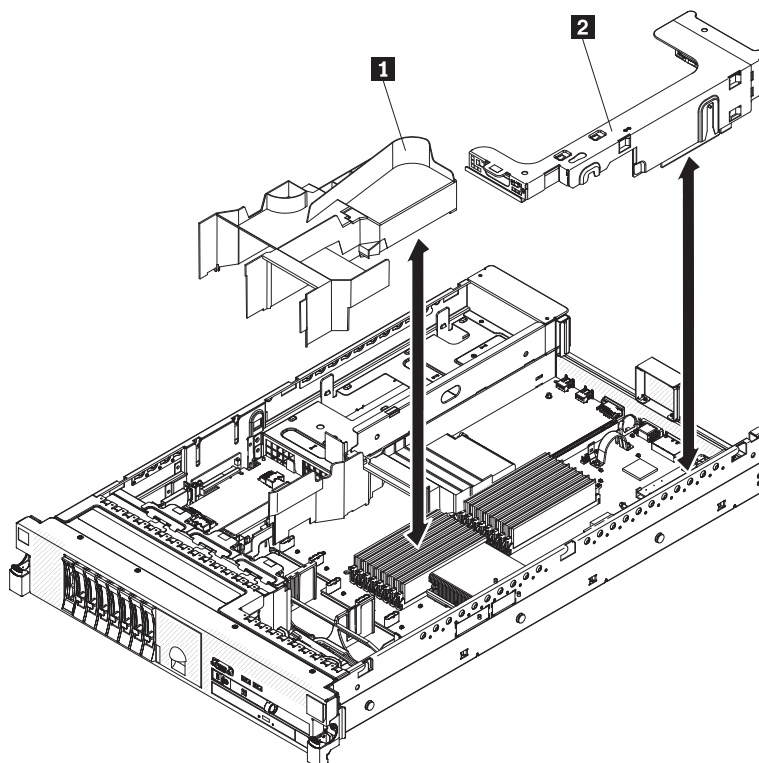
To remove the DIMM air baffle, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Remove the cover (see “Removing the cover” on page 159).
4. Remove PCI riser-card assembly 1 (see “Removing a PCI riser-card assembly” on page 167).
5. Place your fingers under the front and back of the top of the air baffle; then, lift the air baffle out of the server.

Attention: For proper cooling and airflow, replace all air baffles before you turn on the server. Operating the server with any air baffle removed might damage server components.

Installing the DIMM air baffle

The following illustration shows how to install the DIMM air baffle.



- 1** DIMM air baffle
- 2** PCI riser-card assembly 1

To install the DIMM air baffle, complete the following steps:

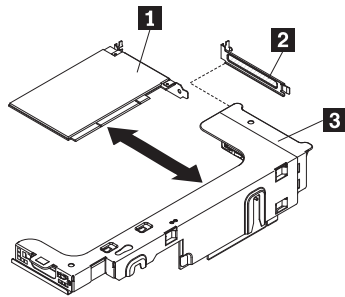
1. Read the safety information that begins on page 3.
2. Make sure that the server and peripheral devices are turned off (see “Turning off the server” on page 53) and that all power cords and external cables are disconnected.
3. Remove the cover.
4. Make sure that PCI riser-card assembly 1 is removed (see “Removing a PCI riser-card assembly” on page 167).
5. Align the DIMM air baffle with the DIMMs and the back of the fans.
6. Lower the air baffle into place, making sure all cables are out of the way.
7. Install PCI riser-card assembly 1.

Attention: For proper cooling and airflow, replace all air baffles before you turn on the server. Operating the server with any air baffle removed might damage server components.

8. Install the cover (see “Completing the installation” on page 227).

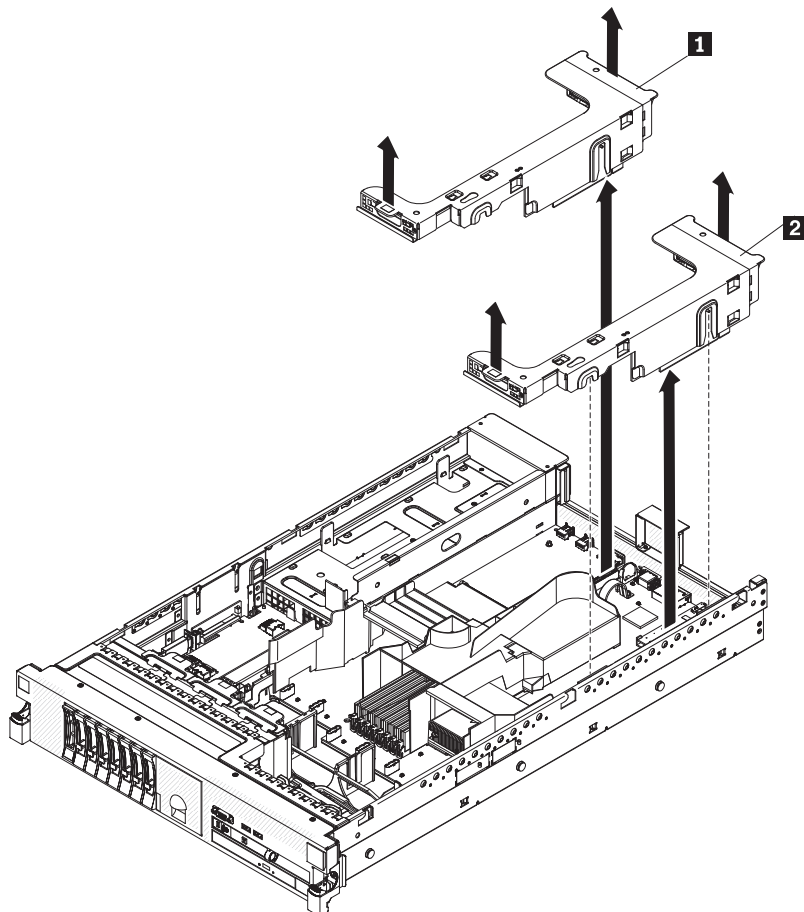
Removing a PCI adapter

To remove an adapter from a PCI riser-card assembly, complete the following steps.



- 1** Adapter
- 2** Expansion slot cover
- 3** PCI riser-card assembly

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Press down on the left and right side rack latches and slide the server out of the rack enclosure until both slide rails lock; then, remove the cover (see “Removing the cover” on page 159).



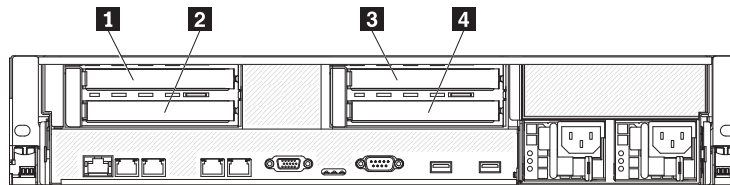
- 1** PCI riser-card assembly 2
- 2** PCI riser-card assembly 1

4. Remove the PCI riser-card assembly that contains the adapter (see “Removing a PCI riser-card assembly” on page 167).
5. Disconnect any cables from the adapter (make note of the cable routing, in case you reinstall the adapter later).
6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the PCI expansion slot.

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Installing a PCI adapter

The following illustration shows the PCI adapter expansion slots.



- 1** PCI slot 1
- 2** PCI slot 2
- 3** PCI slot 3
- 4** PCI slot 4

The following notes describe the types of adapters that the server supports and other information that you must consider when installing an adapter:

- Locate the documentation that comes with the adapter and follow those instruction in addition to the instructions in this section. If you have to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- To ensure that a ServeRAID-10i, ServeRAID-10is, or ServeRAID-10M adapter works correctly in your UEFI-based server, make sure that the adapter firmware is at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

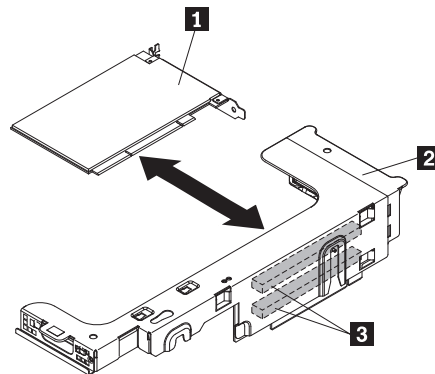
- Some high performance video adapters are supported by your server. See <http://www.lenovo.com/thinkserver/> for more information.
- The following notes describe important information about the NVIDIA video adapter that comes preinstalled in some server models:
 - Do not set the maximum digital video resolution above 1600 x 1200 at 60 Hz for an LCD monitor. This is the highest resolution that is supported for an optional video adapter in the server.
 - Any high-definition video-out connector or stereo connector on an optional video adapter is not supported.
- A PCI Express Gen 2 x16 riser card can support only one adapter.

- The expansion slots in the PCI riser cards accommodate the various form factors of the non-hot-plug adapters as follows:
 - Expansion slot 1: Full-height, full-length
 - Expansion slot 2: Low-profile with standard bracket
 - Expansion slot 3: Full-height, full-length
 - Expansion slot 4: Full-height, half-length

If you install a different supported riser-card assembly, the supported adapter types might be different. For a list of supported riser-card assemblies, see <http://www.lenovo.com/thinkserver>.

- The system scans devices in the following order, if you have not changed the default boot precedence:
 - Video unified extensible firmware interface (UEFI) (fixed)
 - System board Ethernet 1 PXE (fixed)
 - System board Ethernet 2 PXE (fixed)
 - System board SAS (or RAID)

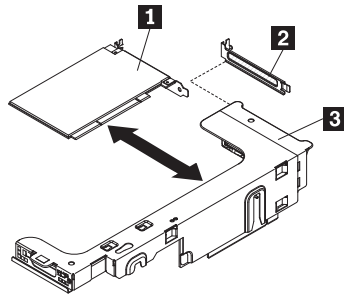
The following illustration shows the adapter connectors on the PCI riser-card assembly.



- 1** Adapter
- 2** PCI riser-card assembly
- 3** Adapter connectors

To install a PCI adapter, complete the following steps:

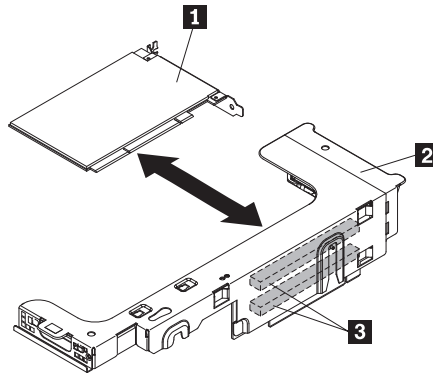
1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Remove the cover (see “Removing the cover” on page 159).
4. Determine which expansion slot you will use for the adapter.
5. If you are installing an adapter in PCI expansion slot 1 or 2, remove PCI riser-card assembly 1; if you are installing an adapter in PCI expansion slot 3 or 4, remove PCI riser-card assembly 2. See “Removing a PCI riser-card assembly” on page 167.
6. Slide the expansion-slot cover out of the PCI riser-card assembly expansion slot.



- 1** Adapter
- 2** Expansion slot cover
- 3** PCI riser-card assembly

7. Install the adapter:

- a. If the adapter is a full-length adapter for the upper expansion slot in the riser card, remove the full-length-adapter bracket from underneath the top of the riser-card assembly and insert it in the end of the upper expansion slot of the riser-card assembly. See “Installing the full-length-adapter bracket” on page 183 for instructions.
- b. Align the adapter with the adapter connector on the riser-card, and the guide on the external end of the PCI riser-card assembly.
- c. Press the adapter firmly into the adapter connector on the riser card.



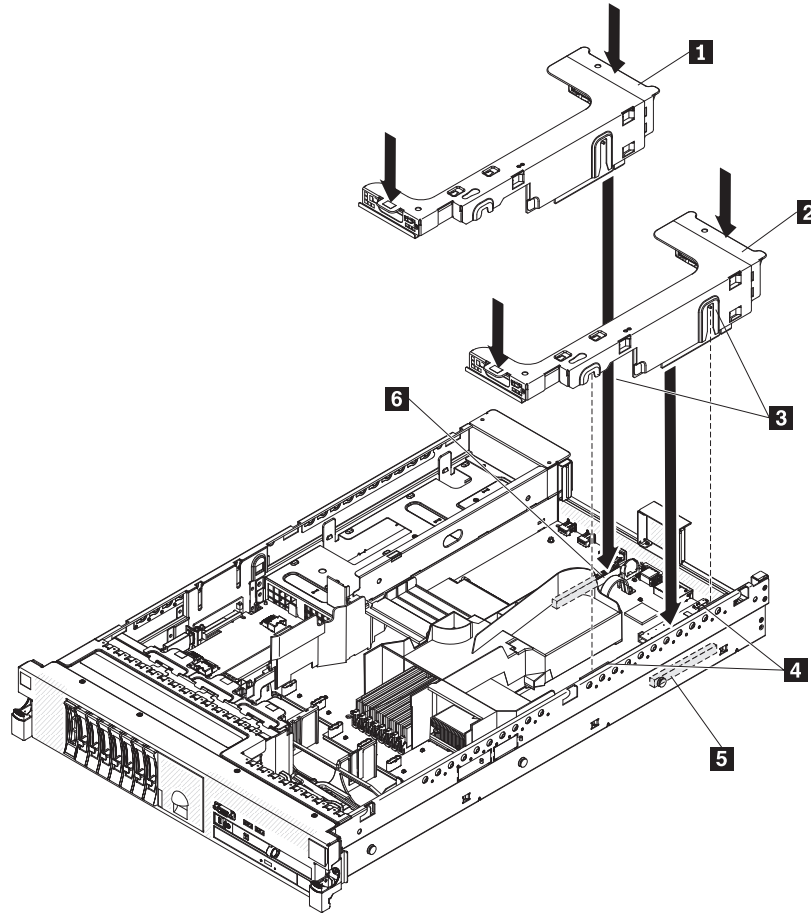
- 1** Adapter
- 2** PCI riser-card assembly
- 3** Adapter connectors

8. Connect any required cables to the adapter.

Attention:

- When you route cables, do not block any connectors or the ventilated space around any of the fans.
- Make sure that cables are not routed on top of components that are under the PCI riser-card assembly.
- Make sure that cables are not pinched by the server components.

9. Align the PCI riser-card assembly with the selected PCI riser connector on the system board.



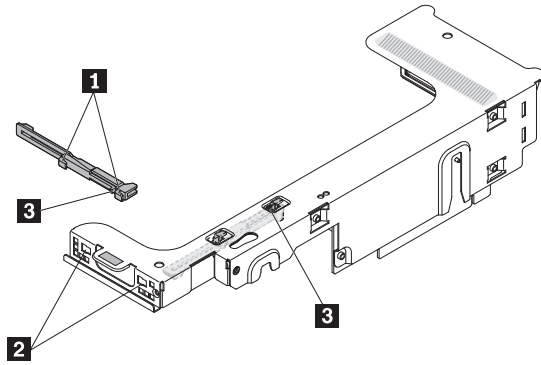
- | | |
|----------|---------------------------|
| 1 | PCI riser-card assembly 2 |
| 2 | PCI riser-card assembly 1 |
| 3 | Alignment slots |
| 4 | Alignment brackets |
| 5 | PCI riser connector 1 |
| 6 | PCI riser connector 2 |

- PCI riser connector 1: Carefully fit the two alignment slots on the side of the assembly onto the two alignment brackets in the side of the chassis; align the rear of the assembly with the guides on the rear of the server
 - PCI riser connector 2: Carefully align the bottom edge (the contact edge) of the riser-card assembly with the PCI riser-card connector on the system board; align the rear of the assembly with the guides on the rear of the server.
10. Press down on the assembly. Make sure that the riser-card assembly is fully seated in the PCI riser-card connector on the system board.
 11. Perform any configuration tasks that are required for the adapter.

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Installing the full-length-adapter bracket

If you are installing a full-length adapter in the upper riser-card PCI slot, you must first install the full-length-adapter bracket in the end of the riser-card assembly.

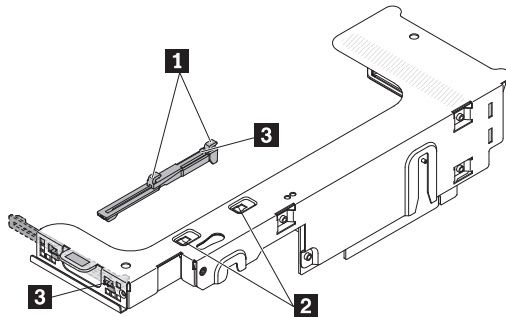


To install the full-length-adapter bracket, complete the following steps:

1. Orient the riser-card assembly as shown.
2. Remove the full-length-adapter bracket from the storage location.
 - a. Press the bracket tab **3** and slide the bracket toward the end of the riser-card assembly.
 - b. Push the bracket out of the storage location on the riser-card assembly.
3. Align the bracket with the end of the riser-card assembly as shown.
4. Place the two hooks **1** in the two openings **2** in the end of the riser-card assembly.
5. Press the bracket tab **3** and slide the bracket to the right until it clicks into place.
6. Return to the adapter-installation instructions.

Storing the full-length-adapter bracket

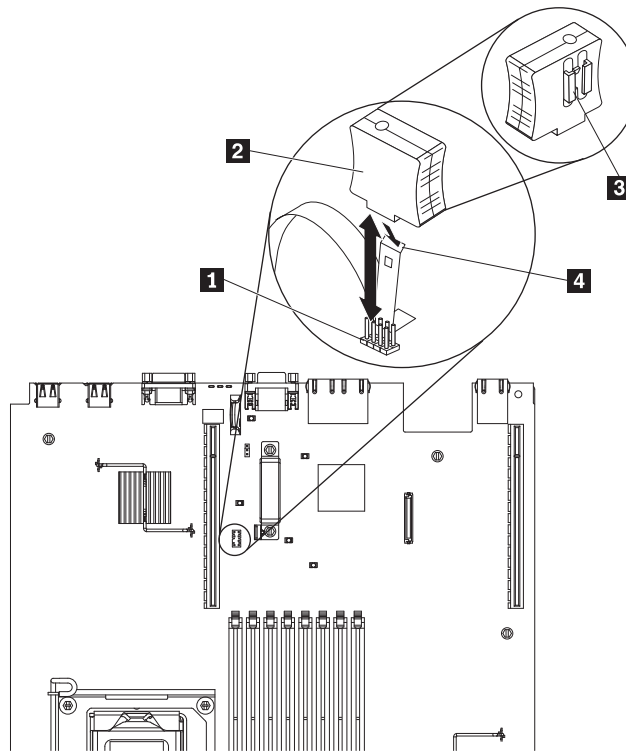
If you are removing a full-length adapter in the upper riser-card PCI slot and will replace it with a shorter adapter or no adapter, you must remove the full-length-adapter bracket from the end of the riser-card assembly and return the bracket to its storage location.



To remove and store the full-length-adapter bracket, complete the following steps:

1. Press the bracket tab **3** and slide the bracket to the left until the bracket falls free of the riser-card assembly.
2. Align the bracket with the storage location on the riser-card assembly as shown.
3. Place the two hooks **1** in the two openings **2** in the storage location on the riser-card assembly.
4. Press the bracket tab **3** and slide the bracket toward the expansion-slot-opening end of the assembly until the bracket clicks into place.
5. Return to “Installing a PCI adapter in a PCI riser-card assembly” on page 171 or “Installing a PCI riser-card assembly” on page 168, as applicable.

Removing a virtual media key



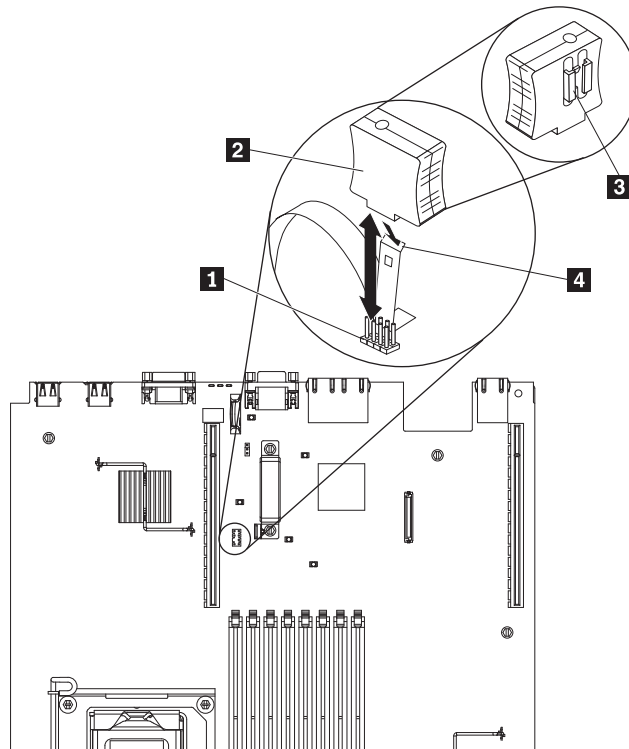
- 1** Virtual media key connector
- 2** Virtual media key (front)
- 3** Mounting bracket (rear)
- 4** Mounting tab

To remove a virtual media key, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Slide the server out of the rack.
4. Remove the cover (see “Removing the cover” on page 159).
5. Locate the virtual media key on the system board. Grasp it and carefully pull it off the virtual media key connector pins.

Installing a virtual media key

IMM Premium enables the IMM remote presence and blue-screen capture capability. This feature provides graphical console redirection with remote keyboard and mouse interaction, plus remote diskette and CD/DVD drive support.



- 1** Virtual media key connector
- 2** Virtual media key (front)
- 3** Mounting bracket (rear)
- 4** Mounting tab

To install a virtual media key, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Remove the cover (see “Removing the cover” on page 159).
4. Align the mounting bracket on the rear of the virtual media key with the mounting tab and slide it down the tab onto the virtual media key connector on the system board. Press the virtual media key down into the connector until it is firmly seated on the system board.

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

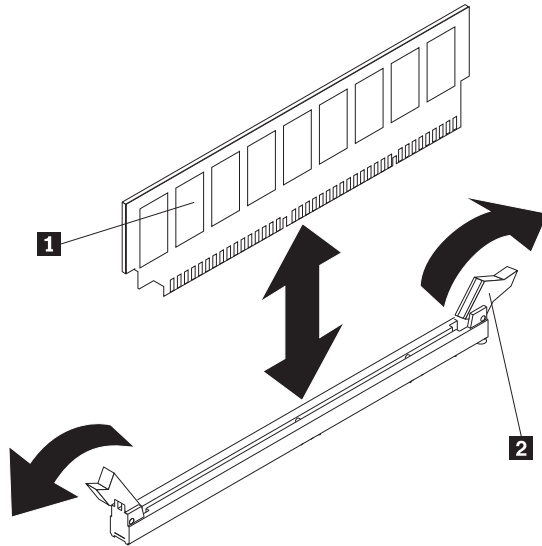
Removing a memory module (DIMM)

To remove a DIMM, complete the following steps.

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Slide the server out of the rack.
4. Remove the cover (see “Removing the cover” on page 159).
5. If riser-card assembly 1 contains one or more adapters, remove it (see “Removing a PCI riser-card assembly” on page 167).

6. Remove the air baffle over the DIMMs (see “Removing the DIMM air baffle” on page 177).

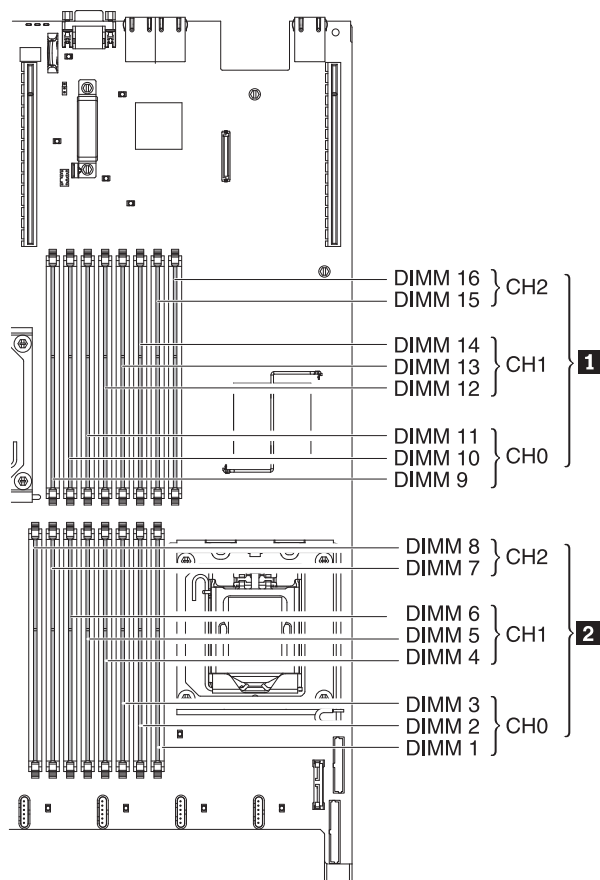
Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.



7. Open the retaining clip **2** on each end of the DIMM connector and lift the DIMM **1** from the connector.
8. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:



- 1** Microprocessor 2
- 2** Microprocessor 1

- The server supports only industry-standard double-data-rate 3 (DDR3), 800, 1066, or 1333 MHz, PC3-10600R-999 (single-rank or dual-rank), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). See <http://www.lenovo.com/thinkserver/> for a list of supported memory modules for the server.
- The server supports a maximum of 16 single-rank or dual-rank DIMMs.
- The server supports three single-rank or dual-rank DIMMs per channel. The following table shows an example of the maximum amount of memory that you can install, using ranked DIMMs.

Table 8. Maximum memory installation using ranked DIMMs

Number of DIMMs	Number of ranks	DIMM size	Total memory
16	Single rank	4 GB	64 GB
16	Dual rank	4 GB	64 GB
16	Dual rank	8 GB (if available)	128 GB

- The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

ggg eRxff-PC3-wwwwwm-aa-bb-cc

where:

ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

e is the number of ranks

1 = single-rank

2 = dual-rank

4 = quad-rank

ff is the device organization (bit width)

4 = x4 organization (4 DQ lines per SDRAM)

8 = x8 organization

16 = x16 organization

wwwww is the DIMM bandwidth, in MBps

6400 = 6.40 GBps (PC3-800 SDRAMs, 8-byte primary data bus)

8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

12800 = 12.80 GBps PC3-1600 SDRAMs, 8-byte primary data bus)

m is the DIMM type

E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

R = Registered DIMM (RDIMM)

U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

aa is the CAS latency, in clocks at maximum operating frequency

bb is the JEDEC SPD Revision Encoding and Additions level

cc is the reference design file for the design of the DIMM

d is the revision number of the reference design of the DIMM

- The following rules apply to single-rank and dual-rank DDR3 DIMM speed as it relates to the number of DIMMs in a channel:
 - When you install 1 DIMM per channel, the memory runs at 1333 MHz
 - When you install 2 DIMMs per channel, the memory runs at 1066 MHz
 - When you install 3 DIMMs per channel, the memory runs at 800 MHz
 - All channels in a server run at the fastest common frequency.
 - Mixing registered and unbuffered DIMMs is not supported.
- The DIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available). The server supports a minimum of 1 GB and a maximum of 128 GB of system memory.

For 32-bit operating systems only: Some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI devices.

- A minimum of one DIMM must be installed for each microprocessor. For example, you must install a minimum of two DIMMs if the server has two microprocessors. However, to improve system performance, install a minimum of three DIMMs for each microprocessor.
- The maximum operating speed of the server is determined by the slowest DIMM in the server.

DIMM installation sequence

The server requires at least one DIMM per microprocessor. The server comes with a minimum of two 1 GB DIMMs, installed in connectors 3 and 6. (Connectors 3 and 6 are the farthest connectors for channels 0 and 1 of microprocessor 1.) When you install additional DIMMs, install them in the order shown in Table 9, to maintain performance.

Important: If you have configured the server to use memory mirroring, do not use the order in Table 9; go to “Memory mirroring” and use the installation order shown there.

Table 9. DIMM installation sequence for non-mirroring (normal) mode

Installed microprocessors	DIMM connector population sequence
Microprocessor socket 1	Install the DIMMs in the following sequence: 3, 6, 8, 2, 5, 7, 1, 4
Microprocessor socket 2	Install the DIMMs in the following sequence: 11, 14, 16, 10, 13, 15, 9, 12

Memory mirroring

Memory-mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs. You must enable memory mirroring through the Setup utility. For details about enabling memory mirroring, see “Memory mirroring.” When you use the memory mirroring feature, consider the following information:

- When you use memory mirroring, you must install a pair of DIMMs at a time. One DIMM must be in channel 0, and the mirroring DIMM must be in the same connector in channel 1. The two DIMMs in each pair must be identical in size, type, rank (single, dual, or quad), and organization. They do not have to be identical in speed. The channels run at the speed of the slowest DIMM in any of the channels. See Table 11 on page 192 for the DIMM connectors that are in each pair.
- Channel 2, DIMM connectors 8, 7, 15, and 16 are not used in memory-mirroring mode.
- The maximum available memory is reduced to half of the installed memory when memory mirroring is enabled. For example, if you install 64 GB of memory, only 32 GB of addressable memory is available when you use memory mirroring.

The following illustration shows the memory channel interface layout with the DIMM installation sequence for mirroring mode. The numbers within the boxes indicate the DIMM population sequence in pairs within the channels, and the numbers next to the boxes indicate the DIMM connectors within the channels. For example, the following illustration shows that the first pair of DIMMs (indicated by ones (1) inside the boxes) should be installed in DIMM connector 3 on channel 0 and DIMM connector 6 on channel 1. DIMM connectors 7, 8, 15, and 16 on channel 2 are not used in memory-mirroring mode.

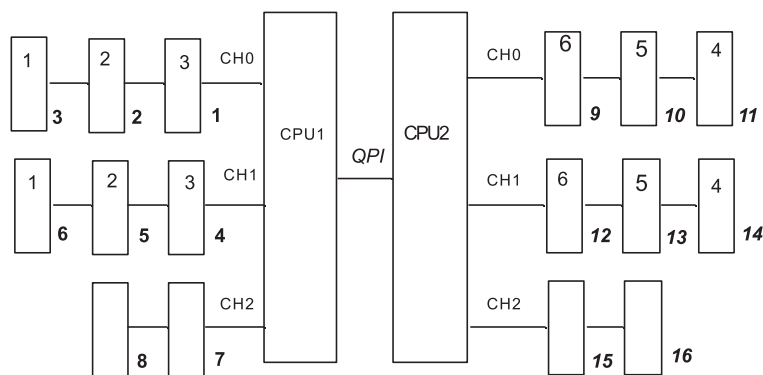


Figure 1. Memory channel interface layout

The following table lists the DIMM connectors on each memory channel.

Table 10. Connectors on each memory channel

Memory channel	DIMM connectors
Channel 0	1, 2, 3, 9, 10, 11
Channel 1	4, 5, 6, 12, 13, 14
Channel 2	7, 8, 15, 16

The following illustration shows the memory connector layout that is associated with each microprocessor. For example, DIMM connectors 9, 10, 11, 12, 13, 14, 15, and 16 (DIMM connectors are shown underneath the boxes) are associated with microprocessor 2 socket (CPU2) and DIMM connectors 1, 2, 3, 4, 5, 6, 7, and 8 are associated with microprocessor 1 socket (CPU1). The numbers within the boxes indicate the installation sequence of the DIMM pairs. For example, the first DIMM pair (indicated within the boxes by ones (1)) should be installed in DIMM connectors 3 and 6, which are associated with microprocessor 1 (CPU1).

Note: You can install DIMMs for microprocessor 2 as soon as you install microprocessor 2; you do not have to wait until all of the DIMM connectors for microprocessor 1 are filled.

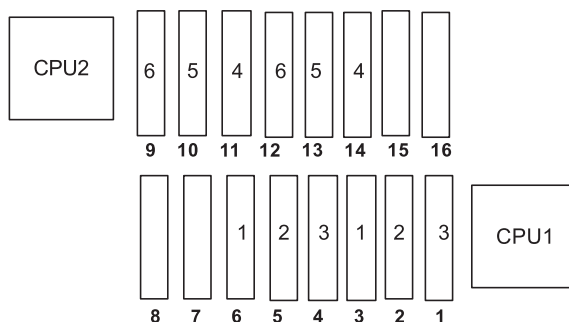


Figure 2. Memory connectors associated with each microprocessor

The following table lists the installation sequence for installing DIMMs in memory-mirroring mode.

Table 11. Memory-mirroring mode DIMM population sequence

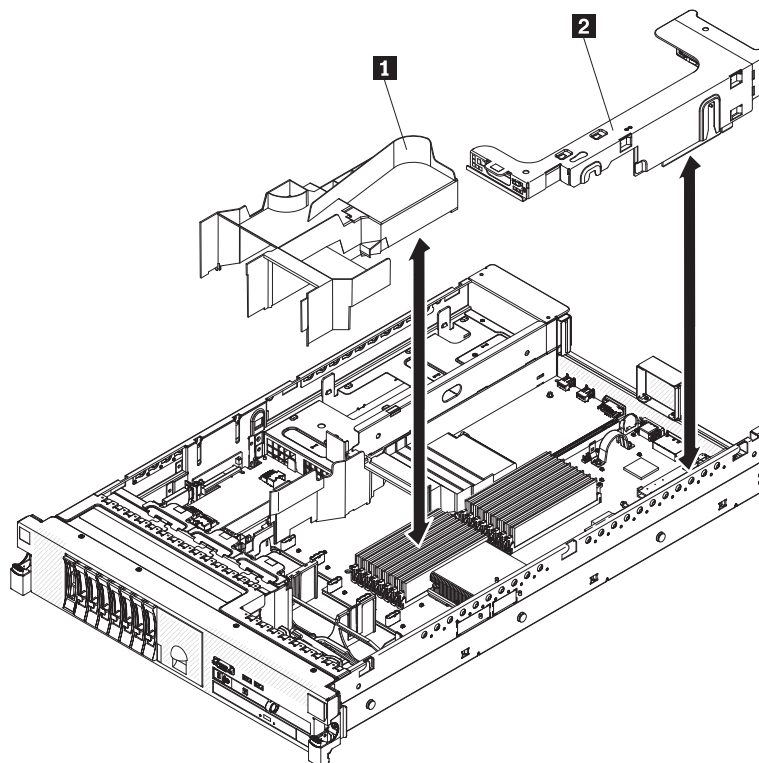
DIMMs	Number of installed microprocessors	DIMM connector
First pair of DIMMs	1	3, 6
Second pair of DIMMs	1	2, 5
Third pair of DIMMs	1	1, 4
Fourth pair of DIMMs	2	14, 11
Fifth pair of DIMMs	2	13, 10
Sixth pair of DIMMs	2	12, 9
Note: DIMM connectors 7, 8, 15, and 16 are not used in memory-mirroring mode.		

When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

Installing a DIMM

To install a DIMM, complete the following steps.

1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables (see “Turning off the server” on page 53).
3. Remove the server cover (see “Removing the cover” on page 159).



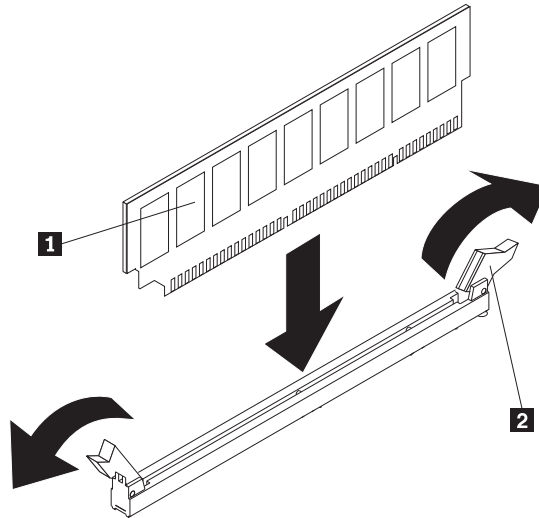
- 1 DIMM air baffle
- 2 PCI riser-card assembly 1

4. If PCI riser-card assembly 1 contains one or more adapters, remove riser-card assembly 1 (see “Removing a PCI riser-card assembly” on page 167).

5. Remove the DIMM air baffle (see “Removing the DIMM air baffle” on page 177).

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

6. Open the retaining clip **2** on each end of the DIMM connector.



7. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the server. Then, remove the DIMM from the package.
8. Turn the DIMM so that the DIMM keys align correctly with the connector.
9. Insert the DIMM into the connector **1** by aligning the edges of the DIMM with the slots at the ends of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

Important: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

10. Install the DIMM air baffle (see “Installing the DIMM air baffle” on page 178).
11. Install PCI riser-card assembly 2, if you removed it (see “Installing a PCI riser-card assembly” on page 168).

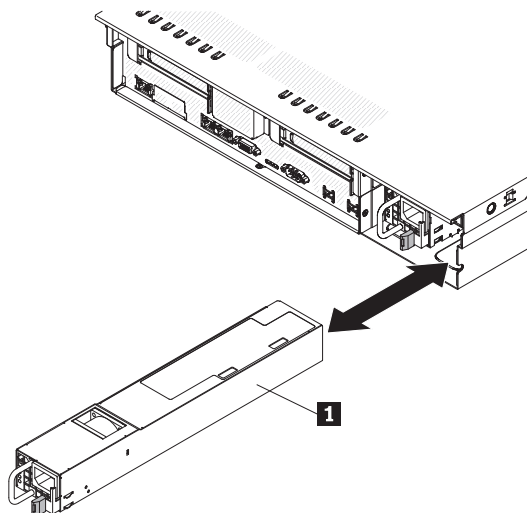
If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Removing a hot-swap power supply

Important: If the server has two power supplies, and if you remove either of them, the server will not have redundant power; if the server power load then exceeds 675 W, the server might not start or might not function correctly.

To remove a power supply, complete the following steps.



1. Read the safety information that begins on page 3 and “Installation guidelines” on page 11.
2. If only one power supply is installed, turn off the server and peripheral devices.
3. Disconnect the power cord from the power supply that you are removing.
4. Grasp the power-supply handle.
5. Press the orange release latch to the left and hold it in place.
6. Pull the power supply **1** part of the way out of the bay, then release the latch and support the power supply as you pull it the rest of the way out of the bay.
7. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap power supply

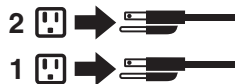
The server supports a maximum of two hot-swap ac power supplies.

Statement 5:



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

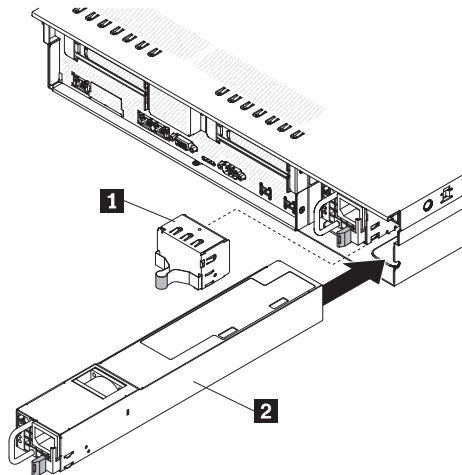


CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.



- 1** Power supply filler panel
- 2** Hot-swap power supply 2

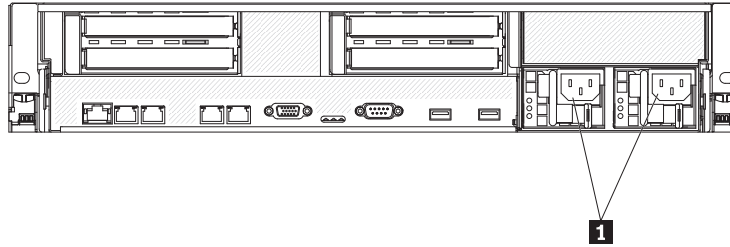
Attention: During normal operation, each power-supply bay must contain either a power supply or power-supply filler **1** for proper cooling.

To install a power supply, complete the following steps:

1. Read the safety information that begins on page 3.
2. Remove the power-supply blank from the empty power-supply bay by pinching the side clip and pulling the power-supply blank from the bay. Save the power-supply blank in case you remove the power supply at a later time.
3. Slide the ac power supply into the bay until the retention latch clicks into place.

4. Connect the power cord for the new ac power supply to the power-cord connector on the power supply.

The following illustration shows the ac power-supply connectors **1** on the rear of the server.



5. Route the power cord through the power-supply handle and through any cable clamps on the rear of the server, to prevent the power cord from being accidentally pulled out when you slide the server in and out of the rack.
6. Connect the power cord to a properly grounded electrical outlet.
7. Make sure that the error LED on the power supply is not lit, and that the dc power LED and ac power LED on the power supply are lit, indicating that the power supply is operating correctly.

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Removing a hot-swap fan

The server comes with three replaceable fans.

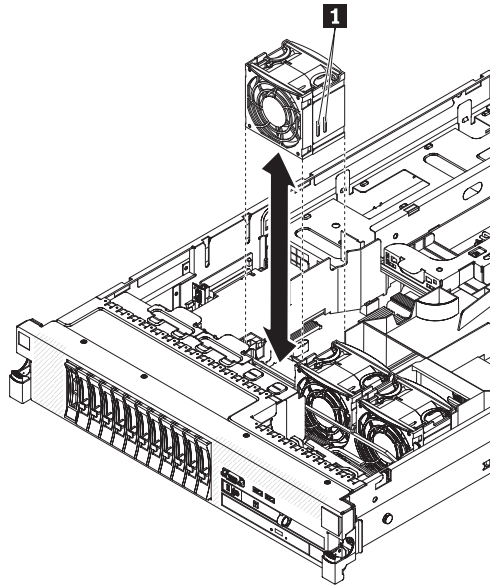
Attention: To ensure proper server operation, if a fan fails, replace it immediately. Have a replacement fan ready to install as soon as you remove the failed fan.

To remove a replaceable fan, complete the following steps.

1. Read the safety information that begins on page 3.
2. Leave the server connected to power.
3. Slide the server out of the rack and remove the cover (see “Removing the cover” on page 159). The LED near the failing fan will be lit.

Attention: To ensure proper system cooling, do not remove the top cover for more than two minutes during this procedure.

4. Lift the fan out of the server, holding the vertical tabs **1**.



5. Replace the fan within 30 seconds (see “Installing a hot-swap fan”).

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Installing a hot-swap fan

The server comes with three replaceable double-fans. For proper cooling, the server requires that all three fans be installed at all times.

Attention: To ensure proper server operation, if a fan fails, replace it immediately. Have a replacement fan ready to install as soon as you remove the failed fan.

The fans use system-board fan connectors 2, 4, and 6 only. Table 12 lists the fan connector on the system board for each double-fan. See “System-board internal connectors” on page 150 for the locations of the fan connectors.

Table 12. Fan connectors on the system board

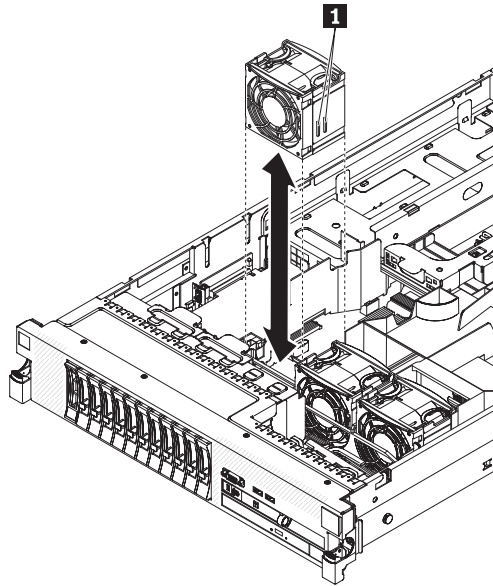
Fan number	System board fan connector
1	2
2	4
3	6

To install any of the three replaceable fans, complete the following steps:

1. Read the safety information that begins on page 3.
2. If you have not done so already, slide the server out of the rack and remove the cover (see “Removing the cover” on page 159).

Attention: To ensure proper system cooling, do not remove the top cover for more than two minutes during this procedure.

3. Orient the new fan over its position in the fan bracket **1** so that the connector on the bottom aligns with the fan connector on the system board.



4. Align the vertical tabs on the fan with the slots on the fan cage bracket.
5. Push the new fan into the fan connector on the system board. Press down on the top surface of the fan to seat the fan fully.

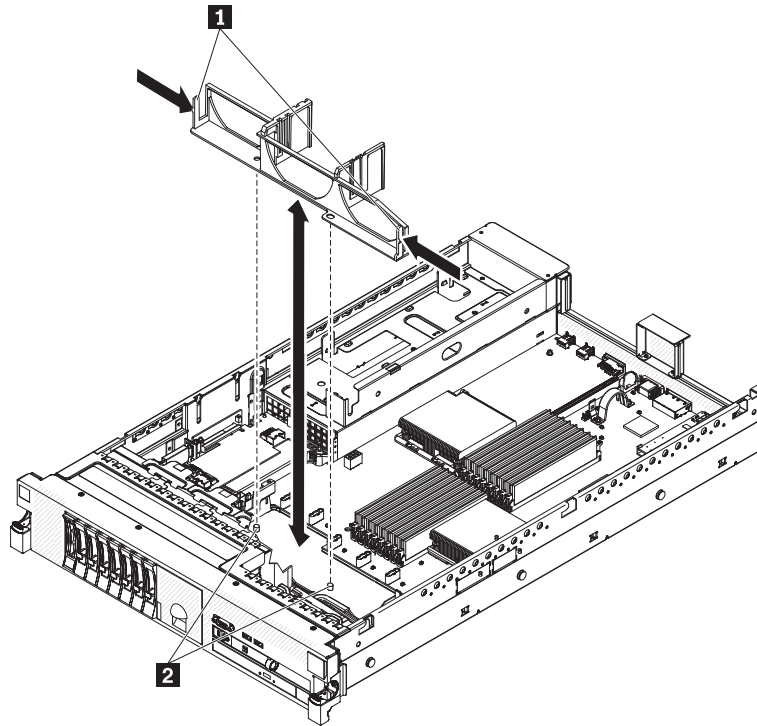
If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Removing the fan bracket

To replace some components or to create working room, you might have to remove the fan-bracket assembly.

Note: To remove or install a fan, it is not necessary to remove the fan bracket. See “Removing a hot-swap fan” on page 196 and “Installing a hot-swap fan” on page 197.

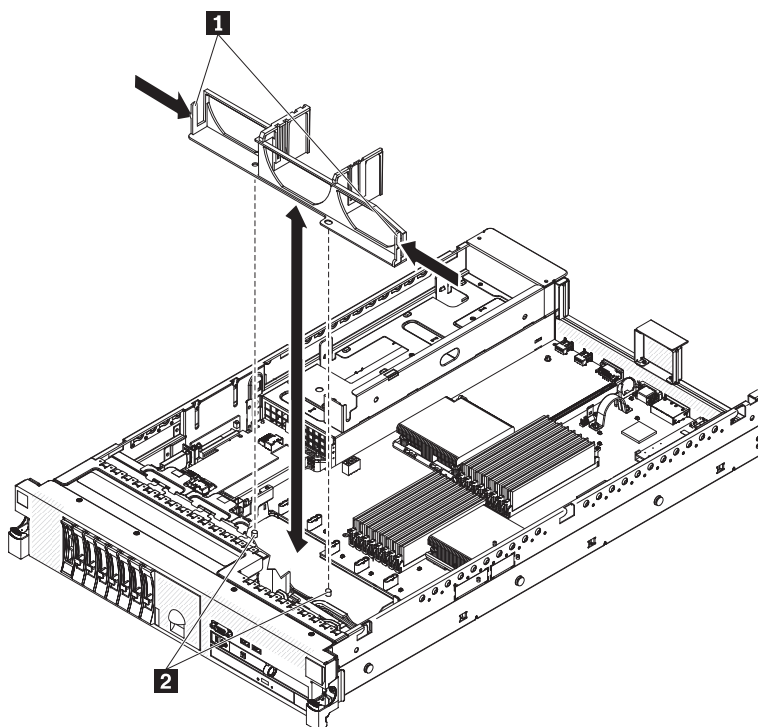
To remove the fan bracket, complete the following steps.



1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover.
4. Remove the fans (see “Removing a hot-swap fan” on page 196).
5. Remove the PCI riser-card assemblies and the DIMM air baffle (see “Removing a PCI riser-card assembly” on page 167 and “Removing the DIMM air baffle” on page 177).
6. Press the fan-bracket release latches **1** toward each other to release the pins **2** and lift the fan bracket out of the server.

Installing the fan bracket

To install the fan bracket, complete the following steps.

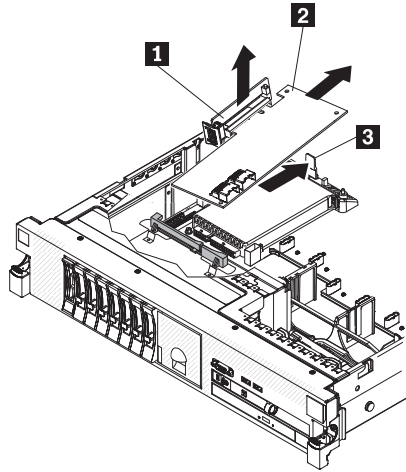


1. Lower the fan bracket into the chassis.
2. Align the holes in the bottom of the bracket with the pins **2** in the bottom of the chassis.
3. Press the bracket into position until the fan-bracket release levers **1** click into place.
4. Replace the fans (see “Installing a hot-swap fan” on page 197).
5. Replace the PCI riser-card assemblies and the DIMM air baffle (see “Installing a PCI riser-card assembly” on page 168 and “Installing the DIMM air baffle” on page 178).
6. Install the cover (see “Completing the installation” on page 227).
7. Slide the server into the rack.
8. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the SAS riser card and controller assembly

To remove the SAS riser-card and controller assembly from the server, complete the steps for the applicable server model.

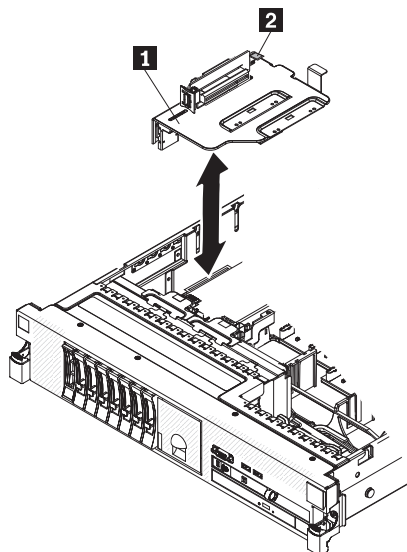
- **12-drive-capable server model:**



- 1** SAS riser card
- 2** SAS controller
- 3** Release tab

1. Press the assembly release latch toward the rear of the server and lift that end of the SAS controller assembly a little. Place your fingers underneath the upper portion of the SAS riser card and lift the assembly from the system board.
2. Lift the assembly out of the server.

- **Tape-enabled server model:**

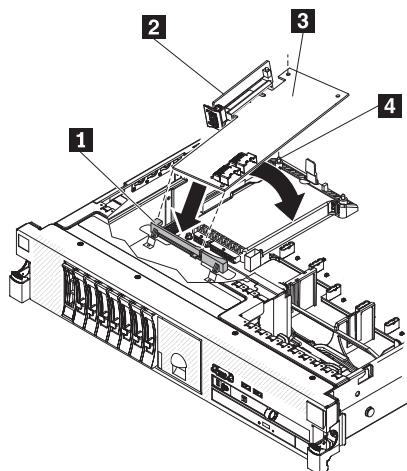


1. Press down on the assembly release latch **2** and lift up on the tab to release the SAS controller assembly, which includes the SAS riser card **1**, from the system board.
2. Lift the front and back edges of the assembly to remove the assembly from the server.

Installing the SAS riser card and controller assembly

To install the SAS riser-card and controller assembly in the server, complete the steps for the applicable server model.

- **12-drive-capable server model:**

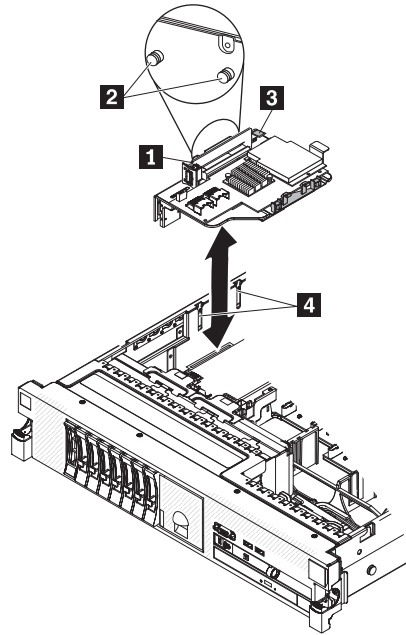


- | | |
|----------|--|
| 1 | SAS controller front retention bracket |
| 2 | SAS riser card |
| 3 | SAS controller |
| 4 | Alignment post |

1. Place the front end of the SAS controller in the front retention bracket and align the SAS riser card with the SAS riser-card connector on the system board.

2. Press down on the SAS riser card and the rear edge of the SAS controller until the SAS riser card is firmly seated and the SAS controller card retention latch clicks into place.

- **Tape-enabled server model:**



1. Align the pins on the back side of the SAS riser card **2** with the slots on the server chassis **4**.
2. Make sure that any tape drive cables are routed correctly underneath the SAS riser card. For information about the cable routing, see “Installing a tape drive” on page 215.
3. Press the SAS controller assembly into place. Make sure that the SAS riser card is firmly seated and that the release latch **3** and retention latch **1** hold the assembly securely.

If you have other devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Removing a SAS controller from the SAS riser card

A SAS controller is installed in a dedicated slot on the SAS riser card.

Important: If you have installed a 4-disk-drive optional expansion device in a 12-drive-capable server, the SAS controller is installed in a PCI riser-card assembly and is installed and removed the same way as any other PCI adapter. Do not use the instructions in this topic; use the instructions in “Installing a PCI adapter” on page 180 and “Removing a PCI adapter” on page 179.

Depending on the server model, the server comes with a ServeRAID-BR10i SAS/SATA controller or a ServeRAID-MR10i SAS/SATA controller installed.

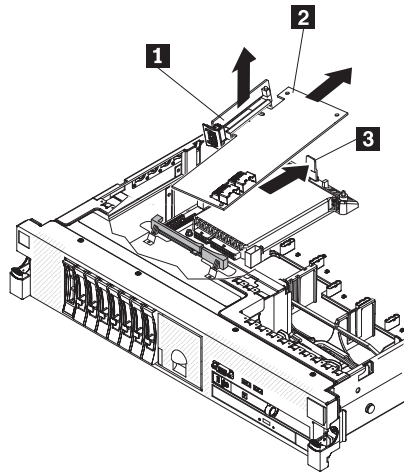
You can replace the SAS controller with another supported SAS controller. For a list of supported RAID controllers, see <http://www.lenovo.com/thinkserver>

Note: For brevity, in this documentation the ServeRAID SAS controller is often referred to as *SAS controller*.

To remove the SAS controller from a SAS riser card, complete the following steps:

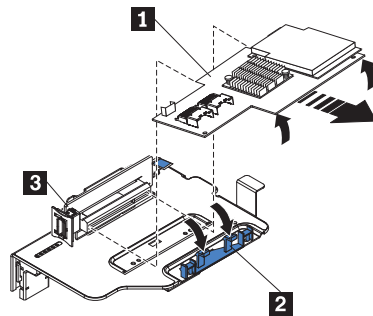
1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables (see “Turning off the server” on page 53).
3. Remove the cover (see “Removing the cover” on page 159).
4. Locate the SAS riser-card and controller assembly near the left front corner of the server.
5. Disconnect the SAS signal cables from the connectors on the SAS controller.
6. Remove the SAS controller assembly, which includes the SAS riser card, from the server (see “Removing the SAS riser card and controller assembly” on page 200).

12-drive-capable server model:



- 1** SAS riser card
- 2** SAS controller
- 3** Release tab

Tape-enabled server model:



7. Press down the retention bracket **2** and pull the SAS controller horizontally **1** out of the connector on the SAS riser card **3**.
8. If you are replacing the SAS controller with another supported SAS controller, continue with “Installing a SAS controller on the SAS riser card.”

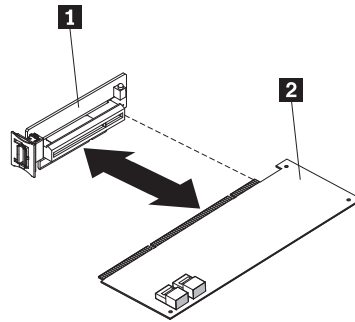
Installing a SAS controller on the SAS riser card

Important: If you have installed a 4-disk-drive optional expansion device in a 12-drive-capable server, the SAS controller is installed in a PCI riser-card assembly and is installed and removed the same way as any other PCI adapter. Do not use

the instructions in this topic; use the instructions in “Installing a PCI adapter” on page 180 and “Removing a PCI adapter” on page 179.

To install a SAS controller on the SAS riser card, complete the following steps:

1. Make sure that the server is turned off, all external cables and power cords are disconnected, and the cover has been removed.
2. If you are installing a new or replacement SAS controller, touch the static-protective package that contains the new SAS controller to any unpainted metal surface on the server. Then, remove the SAS controller from the package.



- 1** SAS riser card
2 RAID adapter

3. If you are installing a new or replacement SAS controller that uses a battery, complete the following steps:
 - a. Remove the battery from the SAS controller package or the battery package.
 - b. Install the battery and connect the battery to the SAS controller as instructed in the documentation that comes with the SAS controller or the battery.
4. If the new SAS controller is a different physical size than the SAS controller you removed, you might have to move the controller retention bracket (tape-enabled model servers only) to the correct location for the new SAS controller. See “Moving the SAS-controller retention bracket” on page 206; then, continue with the next step in this procedure.
5. Turn the SAS controller so that the keys on the bottom edge align correctly with the connector on the SAS riser card in the SAS controller assembly.
6. Firmly press the SAS controller horizontally into the connector on the SAS riser card.
7. (Tape-enabled model server only) Gently press the opposite edge of the SAS controller into the controller retention bracket.
8. Install the SAS riser card and controller assembly (see “Removing the SAS riser card and controller assembly” on page 200).

If you have other optional devices to install or remove, do so now. Otherwise, go to “Completing the installation” on page 227.

Notes:

1. When you restart the server for the first time after you install a SAS controller with a battery, the monitor screen remains blank while the controller initializes the battery. This might take a few minutes, after which the startup process continues. This is a one-time occurrence.

Important: You must allow the initialization process to be completed. If you do not, the battery pack will not work, and the server might not start.

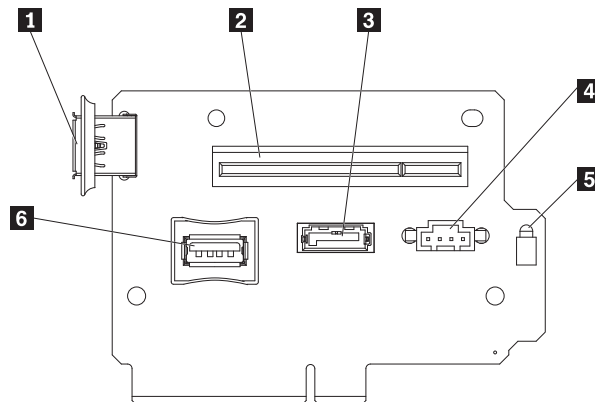
The battery comes partially charged, at 30% or less of capacity. Run the server for 4 to 6 hours to fully charge the controller battery. The LED just above the battery on the controller remains lit until the battery is fully charged.

Until the battery is fully charged, the controller firmware sets the controller cache to write-through mode; after the battery is fully charged, the controller firmware re-enables write-back mode.

2. When you restart the server, you will be given the opportunity to import the existing RAID configuration to the new SAS controller.

Moving the SAS-controller retention bracket

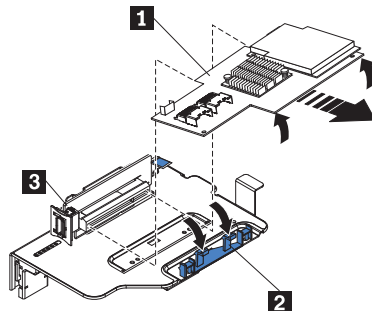
Note: This procedure applies only to servers that have the following SAS riser card installed.



- | | |
|----------|--------------------------|
| 1 | USB connector |
| 2 | PCI Express RAID adapter |
| 3 | SATA tape signal |
| 4 | Tape drive power |
| 5 | SAS controller error LED |
| 6 | USB tape |

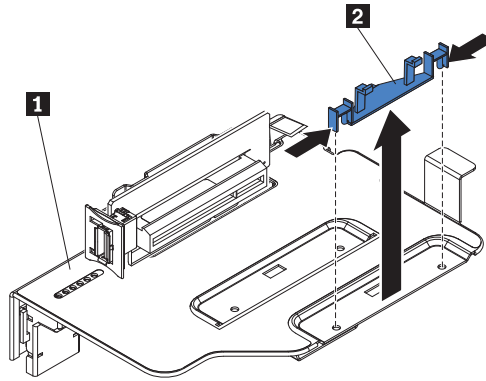
To move the SAS-controller retention bracket to a different position to accommodate the dimensions of the current SAS controller, complete the following steps:

1. Read the safety information that begins on page 3.
2. Make sure that the server and all peripheral devices are turned off and that the power cords and all external cables are disconnected.
3. Remove the SAS riser-card assembly from the server (see “Removing the SAS riser card and controller assembly” on page 200).
4. Remove the RAID controller from the SAS riser card.

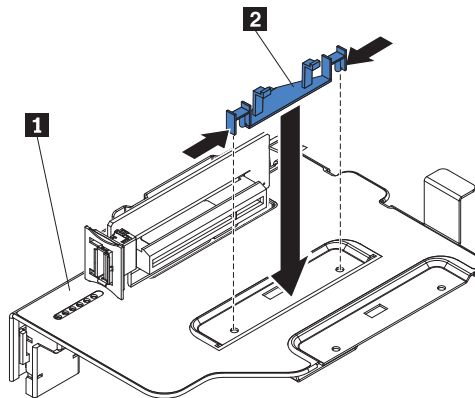


- 1** RAID controller
- 2** Retention bracket
- 3** SAS riser card

5. Remove the retention bracket from the current location:
 - a. Pinch the bottoms of both bracket posts and push the posts up out of the SAS riser-card assembly.



- b. Rotate the bracket **2** to free the bracket tab from the slot on the SAS riser-card assembly **1**.
6. Install the retention bracket in the new location on the SAS riser-card assembly:

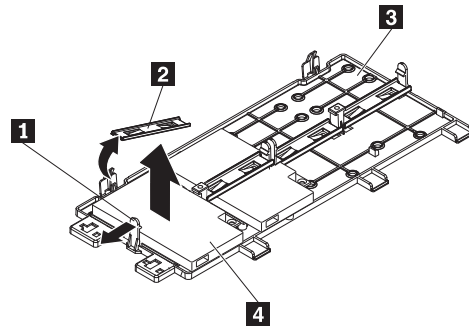


- a. Insert the bracket tab **2** into the slot on the SAS riser-card assembly **1**.
 - b. Rotate the bracket so that the bracket posts align with the holes in the SAS riser-card assembly.
 - c. Press the posts through the holes in the SAS riser-card assembly until they click into place.
 - d. Install the SAS controller on the SAS riser card (see “Installing a SAS controller on the SAS riser card” on page 204).
 - e. Install the riser-card assembly in the server (see “Installing the SAS riser card and controller assembly” on page 202).
 - f. Connect the power cords and all external cables, and turn on the server and peripheral devices.

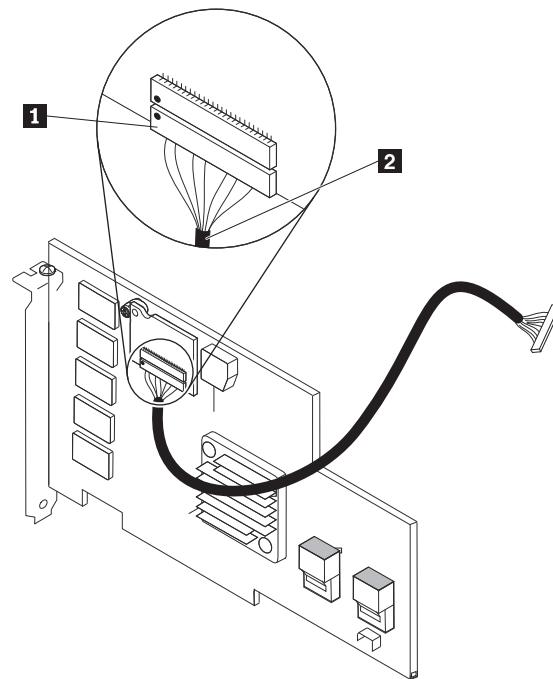
Removing a SAS controller battery from the remote battery tray

To remove a SAS controller battery from the remote battery tray, complete the following steps:

1. Read the safety information that begins on page Chapter 2, “Safety information,” on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 159).
4. Locate the remote battery tray in the server and remove the battery that you want to replace:
 - a. Remove the battery retention clip **2** from the tabs **1** that secure the battery **4** to the remote battery tray **3**.



- b. Lift the battery and battery carrier from the tray and carefully disconnect the remote battery cable from the interposer card on the SAS controller.

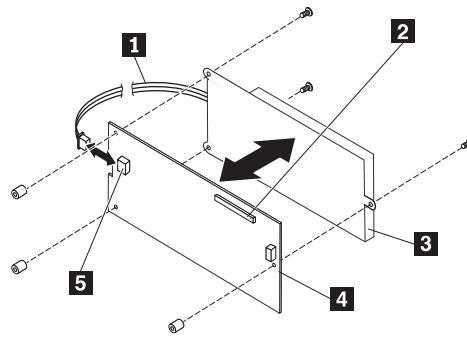


- 1** Remote battery cable connector
2 Remote battery cable

- c. Disconnect the battery carrier cable from the battery.
 - d. Squeeze the clip on the side of the battery and battery carrier to remove the battery from the battery carrier.

Note: If your battery and battery carrier are attached with screws instead of a locking-clip mechanism, remove the three screws to remove the

battery from the battery carrier.



- 1 Battery cable
- 2 Remote battery cable connector
- 3 Battery
- 4 Battery carrier
- 5 Battery connector

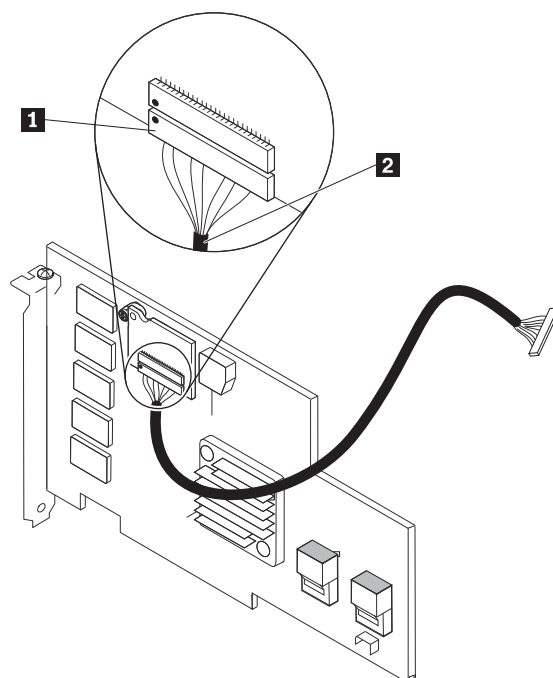
- e. If you are instructed to return the SAS controller battery, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a SAS controller battery on the remote battery tray

To install a SAS controller battery on the remote battery tray, complete the following steps:

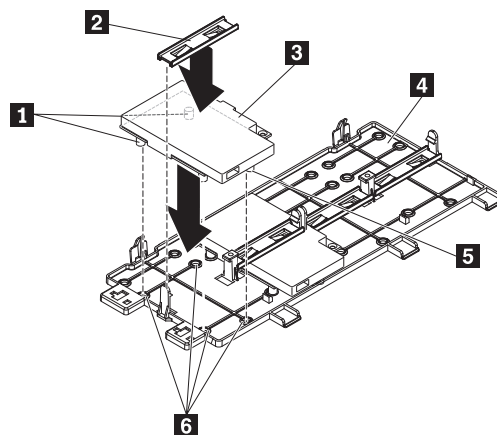
1. Install the replacement battery on the remote battery tray:
 - a. Place the replacement battery on the battery carrier from which the former battery had been removed, and connect the battery carrier cable to the replacement battery.
 - b. Connect the remote battery cable to the interposer card.

Attention: To avoid damage to the hardware, make sure that you align the black dot on the cable connector with the black dot on the connector on the interposer card. *Do not force the remote battery cable into the connector.*



- 1** Remote battery cable connector
- 2** Remote battery cable

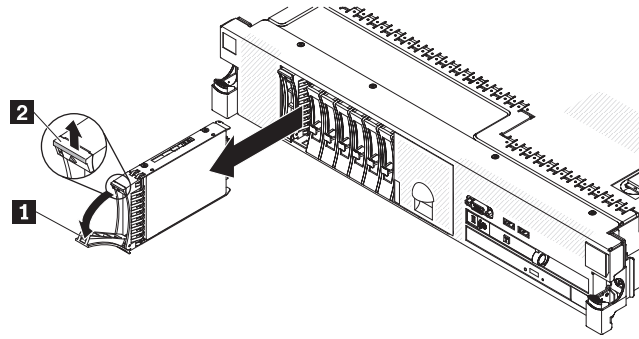
- c. On the remote battery tray, find the pattern of recessed rings that matches the posts on the battery and battery carrier.



- 1** Posts
- 2** Battery retention clip
- 3** Battery
- 4** Battery tray
- 5** Post
- 6** Rings

- d. Press the posts into the rings and underneath the tabs on the remote battery tray.
- e. Secure the battery to the tray with the battery retention clip.
- 2. Install the cover “Completing the installation” on page 227.

Removing a hot-swap hard disk drive



Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each bay.

To remove a hard disk drive from a hot-swap bay, complete the following steps.

1. Read the safety information that begins on page 3.
2. Press up on the release latch **2** at the top of the drive front.
3. Rotate the handle **1** on the drive downward to the open position.
4. Pull the hot-swap drive assembly out of the bay approximately 25 mm (1 inch). Wait approximately 45 seconds while the drive spins down before you remove the drive assembly completely from the bay.
5. If you are instructed to return the hot-swap drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

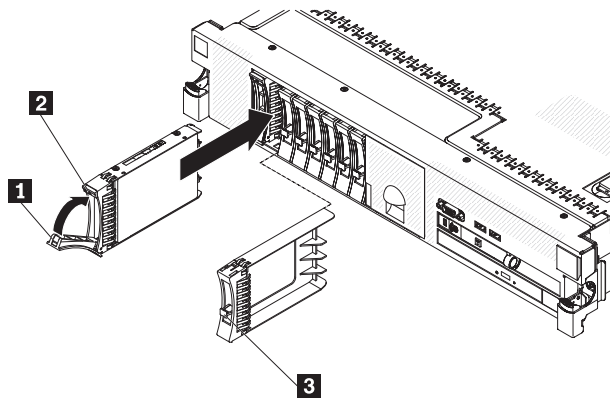
Installing a hot-swap hard disk drive

Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this section.

The following notes describe the type of hard disk drive that the server supports and other information that you must consider when installing a hard disk drive:

- The server supports eight 2.5-inch hot-swap hard disk drives installed on Ultra-Slim hard disk drive trays for 2.5-inch drives. An optional 4-drive-bay kit is available for 12-drive-capable server models. For a list of supported 2.5-inch hard disk drives, see <http://www.lenovo.com/thinkserver>.
- All hot-swap drives in the server should have the same throughput speed rating. Mixing hard disk drives with different speed ratings will cause all drives to operate at the lower throughput speed.
- The ID that is assigned to each bay is printed on the front of the server above the drive bay.

Important: Do not install a SCSI hard disk drive in this server.



- 1** Handle
- 2** Latch
- 3** Filler panel handle

To install a drive in a hot-swap bay, complete the following steps.

Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each bay.

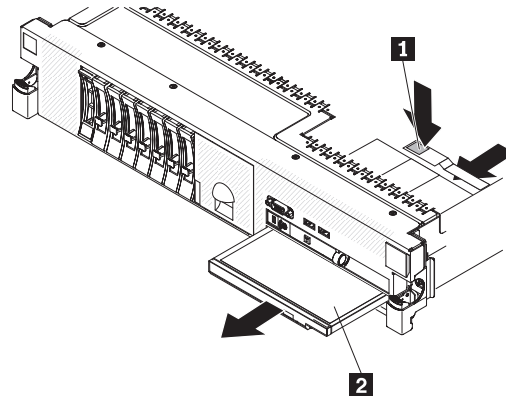
1. Orient the drive as shown in the illustration.
2. Make sure that the tray handle is open.
3. Align the drive assembly with the guide rails in the bay.
4. Gently push the drive assembly into the bay until the drive stops.
5. Push the tray handle to the closed (locked) position.
6. If the system is turned on, check the hard disk drive status LED to verify that the hard disk drive is operating correctly.

After you replace a failed hard disk drive, the green activity LED flashes as the disk spins up. The amber LED turns off after approximately 1 minute. If the new drive starts to rebuild, the amber LED flashes slowly, and the green activity LED remains lit during the rebuild process. If the amber LED remains lit, see “Hard disk drive problems” on page 144.

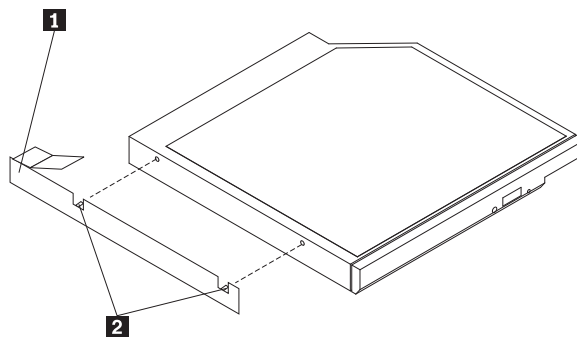
Note: You might have to reconfigure the disk arrays after you install hard disk drives.

Removing a CD-RW/DVD drive

To remove the CD-RW/DVD drive, complete the following steps.



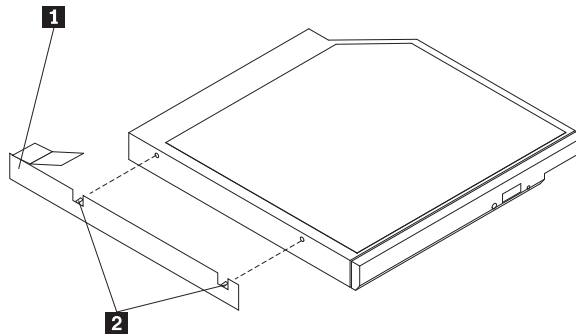
1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect all power cords and external cables.
3. Slide the server out of the rack; then, remove the cover (see “Removing the cover” on page 159).
4. Press the release tab down **1** to release the drive; then, while you press the tab, push the drive toward the front of the server.
5. From the front of the server, pull the drive out of the bay **2**.



6. Remove the drive retention clip **1** from the drive (held with alignment pins **2**).
7. If you are instructed to return the CD-RW/DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a CD-RW/DVD drive

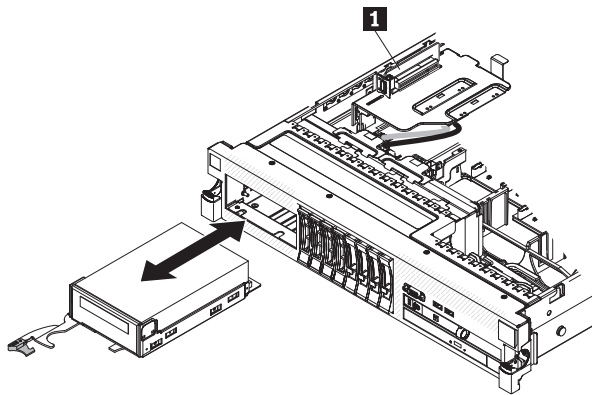
To install the replacement CD-RW/DVD drive, complete the following steps.



1. Attach the drive-retention clip **1** to the side of the drive.
2. Slide the drive into the CD/DVD drive bay (using the alignment pins **2**) until the drive clicks into place.
3. Install the cover (see “Completing the installation” on page 227).
4. Slide the server into the rack.
5. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing a tape drive

The following illustration shows how to remove an optional tape drive from the server.

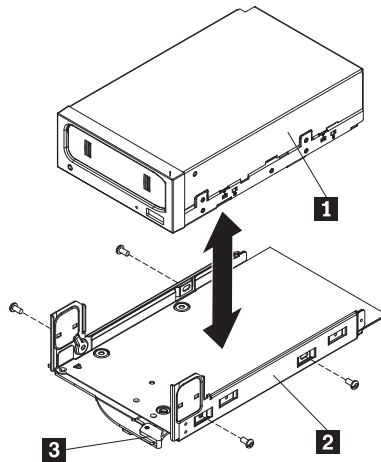


1 SAS riser card

To remove a tape drive from the server, complete the following steps:

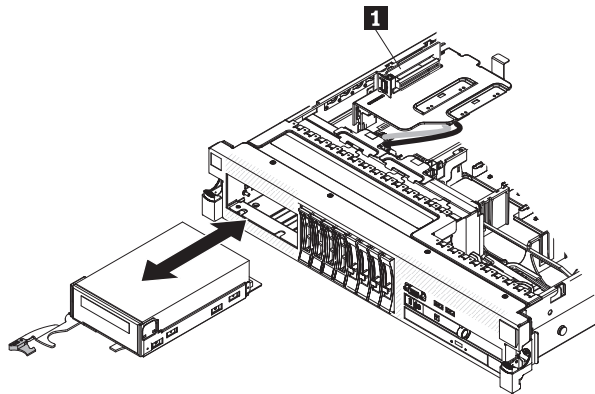
1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Slide the server out of the rack; then, remove the cover (see “Removing the cover” on page 159).
4. Open the tape drive tray release latch **3** and slide the drive tray out of the bay approximately 25 mm (1 inch).
5. Disconnect the power and signal cables from the rear of the tape drive.
6. Pull the drive completely out of the bay.

7. Remove the tape drive **1** from the drive tray **2** by removing the four screws on the sides of the tray.



8. If you are not installing another drive in the bay, insert the tape drive filler panel into the empty tape drive bay.
9. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

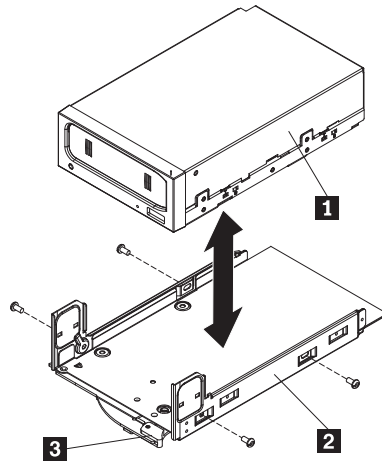
Installing a tape drive



1 SAS riser card

To install a tape drive, complete the following steps:

1. If the tape drive came with metal spacers on the installed on the sides, remove the spacers.
2. Install the drive tray on the new tape drive as shown, using the four screws that you removed from the former drive.



- 1** Tape drive
- 2** Tray
- 3** Latch

3. Prepare the drive according to the instructions that come with the drive, setting any switches or jumpers.
4. Slide the tape-drive assembly most of the way into the tape-drive bay.
5. Using the cables from the former tape drive, connect the signal and power cables to the back of the tape drive.
6. Make sure all the cables are out of the way, and slide the tape-drive assembly the rest of the way into the tape-drive bay.
7. Push the tray handle to the closed (locked) position.
8. Install the cover (see “Completing the installation” on page 227).
9. Slide the server into the rack.
10. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing a microprocessor and heat sink

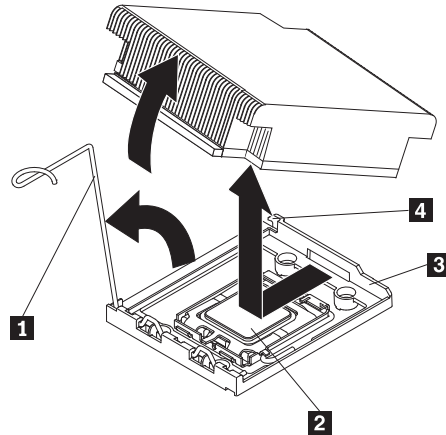
Attention:

- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Dropping the microprocessor during installation or removal can damage the contacts.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor and heat sink, complete the following steps:

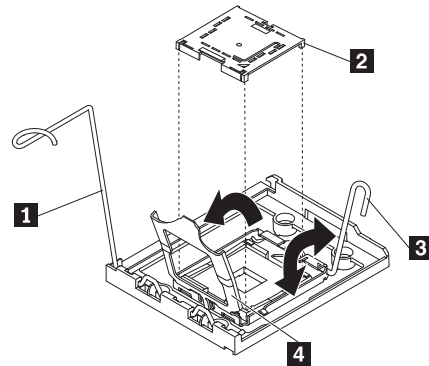
1. Read the safety information that begins on page 3.
2. Turn off the server and peripheral devices and disconnect the power cord and all external cables.
3. Remove the cover.
4. Depending on which microprocessor you are removing, remove the following components, if necessary:

- Microprocessor 1: PCI riser-card assembly 1 and DIMM air baffle (see “Removing a PCI riser-card assembly” on page 167 and “Removing the DIMM air baffle” on page 177)
 - Microprocessor 2: PCI riser-card assembly 2 and microprocessor 2 air baffle (see “Removing a PCI riser-card assembly” on page 167 and “Removing the microprocessor 2 air baffle” on page 175).
5. Open the heat-sink release lever to the fully open position.



- 1** Heat-sink release lever
- 2** Microprocessor
- 3** Retainer bracket
- 4** Lock tab

6. Lift the heat sink out of the server. If the heat sink sticks to the microprocessor, slightly twist the heat sink back and forth to break the seal. After removal, place the heat sink on its side on a clean, flat surface.
7. Release the microprocessor retention latch **1** by pressing down on the end, moving it to the side, and releasing it to the open (up) position.



8. Open the microprocessor bracket frame **4** by lifting up the tab on the top edge. Keep the bracket frame in the open position.
9. Carefully lift the microprocessor **2** straight up and out of the socket, and place it on a static-protective surface.
10. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a microprocessor and heat sink

Read the documentation that comes with the microprocessor to determine whether you must update the firmware.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To download the most current level of server firmware, complete the following steps:

1. Go to: <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Important:

- A startup (boot) microprocessor must always be installed in microprocessor connector 1 on the system board.
- To ensure correct server operation, make sure that you use microprocessors that are compatible and you have installed an additional DIMM for microprocessor 2. Compatible microprocessors must have the same QuickPath Interconnect (QPI) link speed, integrated memory controller frequency, core frequency, power segment, cache size, and type.
- Microprocessors with different stepping levels are supported in this server. If you install microprocessors with different stepping levels, it does not matter which microprocessor is installed in microprocessor connector 1 or connector 2.
- If you are installing a microprocessor that has been removed, make sure that it is paired with its original heat sink or a new replacement heat sink. Do not reuse a heat sink from another microprocessor; the thermal grease distribution might be different and might affect conductivity.
- If you are installing a new heat sink, remove the protective backing from the thermal material that is on the underside of the new heat sink.
- If you are installing a new heat-sink assembly that did not come with thermal grease, see "Thermal grease" on page 220 for instructions for applying thermal grease; then, continue with step 1 of this procedure.
- If you are installing a heat sink that has contaminated thermal grease, see "Thermal grease" on page 220 for instructions for replacing the thermal grease; then, continue with step 1 of this procedure.

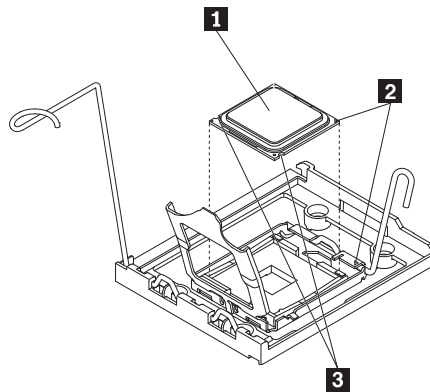
To install a new or replacement microprocessor, complete the following steps. The following illustration shows how to install a microprocessor on the system board.

1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Rotate the microprocessor release lever on the socket from its closed and locked position until it stops in the fully open position.

Attention:

- Do not touch the microprocessor contact; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
 - Handle the microprocessor carefully. Dropping the microprocessor during installation or removal can damage the contacts.
 - Do not use excessive force when you press the microprocessor into the socket.
 - Make sure that the microprocessor is oriented and aligned and positioned in the socket before you try to close the lever.
3. Align the microprocessor with the socket (note the alignment mark and the position of the notches); then, carefully place the microprocessor on the socket. Close the microprocessor bracket frame.

Note: The microprocessor fits only one way on the socket.

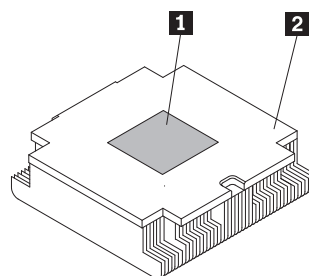


- 1 Microprocessor
- 2 Alignment marks
- 3 Notches

4. Carefully close the microprocessor release lever to secure the microprocessor in the socket.
5. Install a heat sink on the microprocessor.

Attention: Do not touch the thermal grease **1** on the bottom of the heat sink **2** or set down the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.

The following illustration shows the bottom surface of the heat sink.



- a. Make sure that the heat-sink release lever is in the open position.
- b. Remove the plastic protective cover from the bottom of the heat sink.

- c. If the new heat sink did not come with thermal grease, apply thermal grease on the microprocessor before you install the heat sink (see “Thermal grease”).
 - d. Align the heat sink above the microprocessor with the thermal grease side down.
 - e. Slide the flange of the heat sink into the opening in the retainer bracket.
 - f. Press down firmly on the heat sink until it is seated securely.
 - g. Rotate the heat-sink release lever to the closed position and hook it underneath the lock tab.
6. Replace the components that you removed in “Removing a microprocessor and heat sink” on page 216:
 - Microprocessor 1: DIMM air baffle and PCI riser-card assembly 1 (see “Installing the DIMM air baffle” on page 178 and “Installing a PCI riser-card assembly” on page 168)
 - Microprocessor 2: Microprocessor 2 air baffle and PCI riser-card assembly 2 (see “Installing the microprocessor 2 air baffle” on page 176 and “Installing a PCI riser-card assembly” on page 168).
 7. Install the cover (see “Completing the installation” on page 227).
 8. Slide the server into the rack.
 9. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Thermal grease

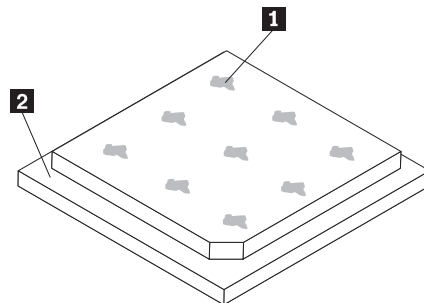
The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

To replace damaged or contaminated thermal grease on the microprocessor and heat exchanger, complete the following steps:

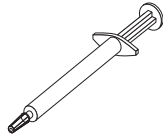
1. Place the heat-sink assembly on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat exchanger.

Note: Make sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal-grease syringe to place nine uniformly spaced dots of 0.02 mL **1** each on the top of the microprocessor **2**.



Note: 0.01mL is one tick mark on the syringe. If the grease is properly applied, approximately half (0.22 mL) of the grease will remain in the syringe.

6. Continue with step 5d on page 220 of the “Installing a microprocessor and heat sink” on page 218 procedure.

Removing the battery

Statement 2:



CAUTION:

When replacing the lithium battery, use only battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

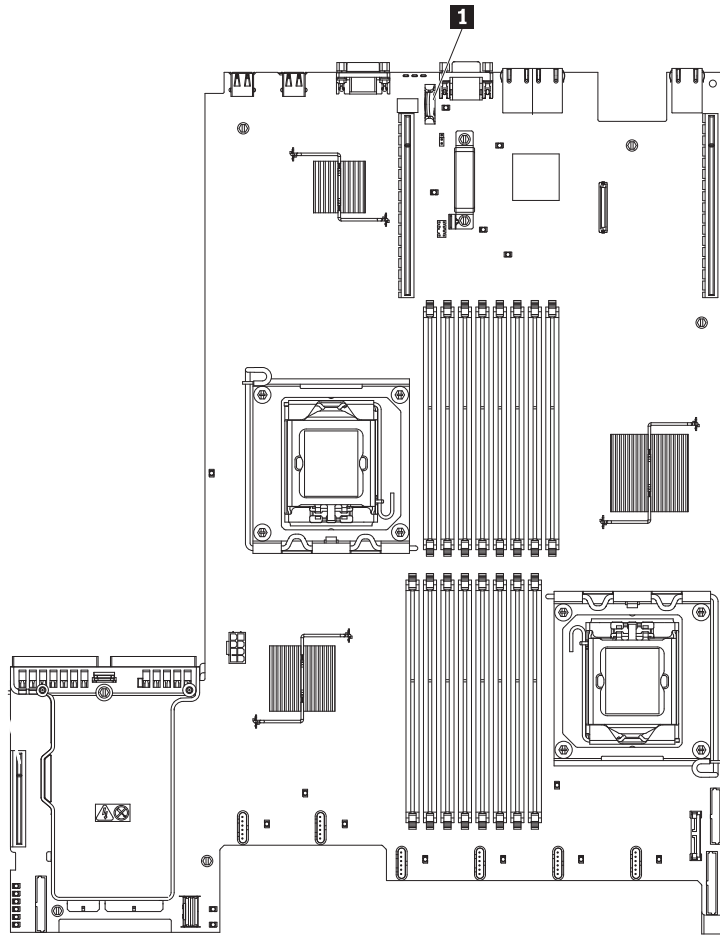
- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

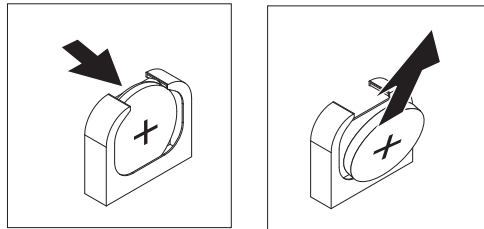
To remove the battery, complete the following steps:

1. Read the safety information that begins on page 3.
2. Follow any special handling and installation instructions that come with the battery.
3. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
4. Slide the server out of the rack.
5. Remove the cover (see “Removing the cover” on page 159).
6. Disconnect any internal cables, as necessary (see “Internal cable routing and connectors” on page 163).

7. Locate the battery on the system board **1**.



8. Remove the battery:
- Use one finger to push the battery horizontally out of its housing, pushing it away from the PCI riser 2.
 - Lift the battery from the socket.



9. Dispose of the battery as required by local ordinances or regulations. See the *Important Notices and Safety Information* on the *ThinkServer Documentation* DVD for more information.

Installing the battery

The following notes describe information that you must consider when you replace the battery in the server.

- You must replace the battery with a lithium battery of the same type from the same manufacturer.

- After you replace the battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:



CAUTION:

When replacing the lithium battery, use only battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

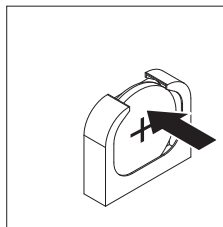
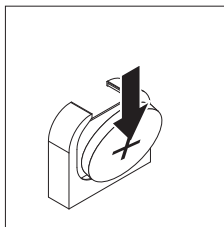
- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

See the *Important Notices* and *Safety Information* document on the *ThinkServer Documentation* DVD for more information.

To install the replacement battery, complete the following steps:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:
 - a. Hold the battery in a vertical orientation so that the smaller side is facing the housing.
 - b. Place the battery into its socket, and press the battery toward the housing and the PCI riser 2 until it snaps into place.



3. Reinstall any adapters that you removed.
4. Reconnect the internal cables that you disconnected (see “Internal cable routing and connectors” on page 163).
5. Install the cover (see “Completing the installation” on page 227).
6. Slide the server into the rack.

7. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Note: You must wait approximately 20 seconds after you connect the power cord of the server to an electrical outlet before the power-control button becomes active.

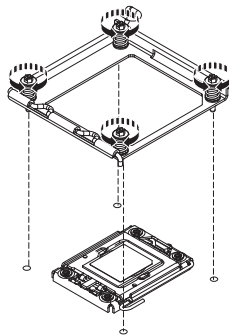
8. Start the Setup utility and reset the configuration.
 - Set the system date and time.
 - Set the power-on password.
 - Reconfigure the server.

Removing a heat-sink retention module

To remove a heat-sink retention module, complete the following steps:

1. Read the safety information that begins on page 3.
2. Turn off the server, and disconnect all power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 159).

Attention: In the following step, keep each heat sink paired with its microprocessor for reinstallation.
4. Remove the applicable air baffle; then, remove the heat sink and microprocessor. See “Removing a microprocessor and heat sink” on page 216 for instructions; then, continue with step 5.

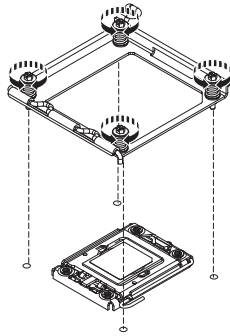


5. Remove the four screws that secure the heat-sink retention module to the system board; then, lift the heat-sink retention module from the system board.
6. If you are instructed to return the heat-sink retention module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a heat-sink retention module

To install a heat-sink retention module, complete the following steps:

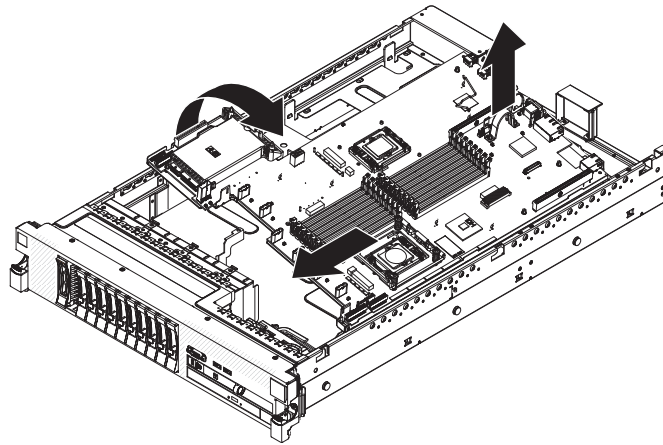
1. Place the heat-sink retention module in the microprocessor location on the system board.



2. Install the four screws that secure the module to the system board.
Attention: Make sure that you install each heat sink with its paired microprocessor (see steps 3 and 4 on page 224).
3. Install the microprocessor, heat sink, and applicable air baffle (see “Installing a microprocessor and heat sink” on page 218).
4. Install the cover.
5. Slide the server into the rack.
6. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

Removing the system board

To remove the system board, complete the following steps.



1. Read the safety information that begins on page 3.
2. Turn off the server, and disconnect all power cords and external cables.
3. Pull the power supplies out of the rear of the server; just enough to disengage them from the server.
4. Remove the server cover (see “Removing the cover” on page 159).

Note: When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.

5. Remove the following components and place them on a static-protective surface for reinstallation:

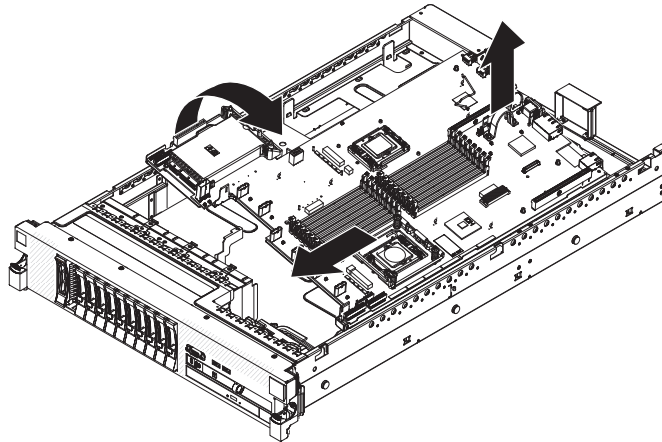
- The riser-card assemblies with adapters (see “Removing a PCI riser-card assembly” on page 167)
 - The SAS riser card and controller assembly (see “Removing the SAS riser card and controller assembly” on page 200)
6. If an Ethernet daughter card is installed in the server, remove it.
 7. If a virtual media key is installed in the server, remove it. (See “Removing a virtual media key” on page 185 for instructions).
 8. Remove the air baffles (see “Removing the DIMM air baffle” on page 177 and “Installing the microprocessor 2 air baffle” on page 176).
Important: Note which DIMMs are in which connectors, before you remove the DIMMs. You must install them in the same configuration on the replacement system board.
 9. Remove all DIMMs, and place them on a static-protective surface for reinstallation (see “Removing a memory module (DIMM)” on page 186).
 10. Remove the fans and fan bracket (see “Removing a hot-swap fan” on page 196 and “Removing the fan bracket” on page 198).
 11. Disconnect all cables from the system board.
Attention: In the following step, do not allow the thermal grease to come in contact with anything, and keep each heat sink paired with its microprocessor for reinstallation. Contact with any surface can compromise the thermal grease and the microprocessor socket; a mismatch between the microprocessor and its original heat sink can require the installation of a new heat sink instead.
 12. Remove each microprocessor heat sink and microprocessor; then, place them on a static-protective surface for reinstallation (see “Removing a microprocessor and heat sink” on page 216).
 13. Push in and lift up the two system board release latches on either side of the fan cage.
 14. Slide the system board forward and tilt it away from the power supplies. Using the lift handle, pull the system board out of the server.
 15. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

Notes:

1. When you reassemble the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure.
2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

To reinstall the system board, complete the following steps.



1. Align the system board as tilted shown, then rotate and lower it flat and slide it back toward the rear of the server.
2. Reconnect to the system board the cables that you disconnected in step 11 of “Removing the system board” on page 225.
3. Rotate the system board release latch toward the rear of the server until the latch clicks into place.
4. Install the fans.
5. Install each microprocessor with its matching heat sink (see “Installing a microprocessor and heat sink” on page 218).
6. Install the DIMMs (see “Installing a DIMM” on page 192).
7. Install the air baffles (see “Installing the DIMM air baffle” on page 178) and “Installing the microprocessor 2 air baffle” on page 176.
8. Install the SAS riser-card and controller assembly (see “Installing the SAS riser card and controller assembly” on page 202).
9. If necessary, install the Ethernet daughter card.
10. If necessary, install the virtual media key.
11. Install the PCI riser-card assemblies and all adapters (see “Installing a PCI riser-card assembly” on page 168).
12. Install the cover (see “Installing the server cover” on page 160).
13. Push the power supplies back into the server.
14. Slide the server into the rack.
15. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

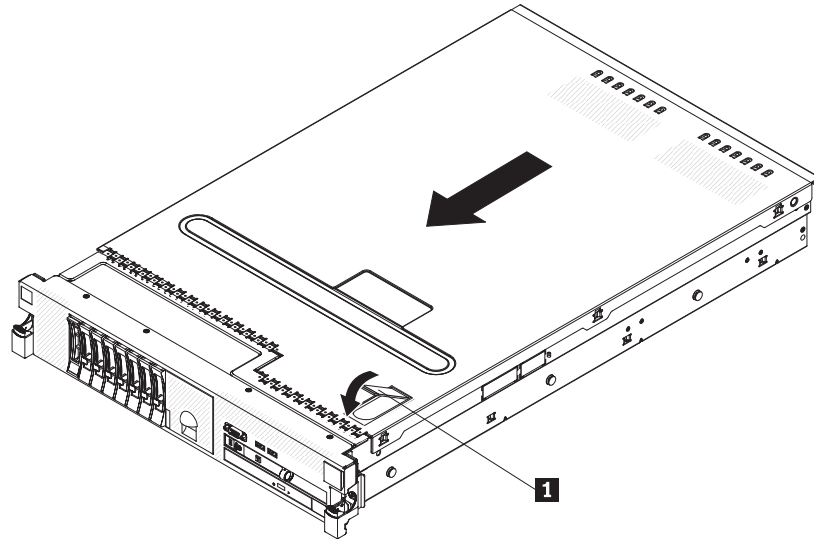
Important: Either update the server with the latest SAS firmware or restore the pre-existing firmware from a diskette or CD image.

Completing the installation

To complete the installation, complete the following steps:

1. If you removed the microprocessor 2 air baffle, replace the microprocessor 2 air baffle (see “Installing the microprocessor 2 air baffle” on page 176)).
2. If you removed the DIMM air baffle, install it now (see “Installing the DIMM air baffle” on page 178).
3. If you removed either of the PCI riser-card assemblies, replace the riser-card assemblies now (see “Installing a PCI riser-card assembly” on page 168).

4. If you removed the server cover, replace it:
 - a. Make sure that all internal cables are correctly routed.
 - b. Place the cover-release latch **1** in the open (up) position.

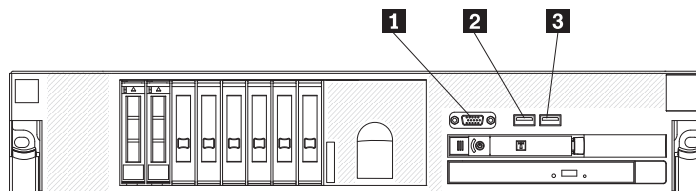


- c. Insert the bottom tabs of the top cover into the matching slots in the server chassis.
 - d. Press down on the cover-release latch to slide the cover forward and lock the cover in place.
 - e. Slide the server into the rack.
5. Install the server in a rack. See the *Rack Installation Instructions* that come with the server for complete rack installation and removal instructions.
6. To attach peripheral devices and connect the power cords, see “Connecting the cables.”

Connecting the cables

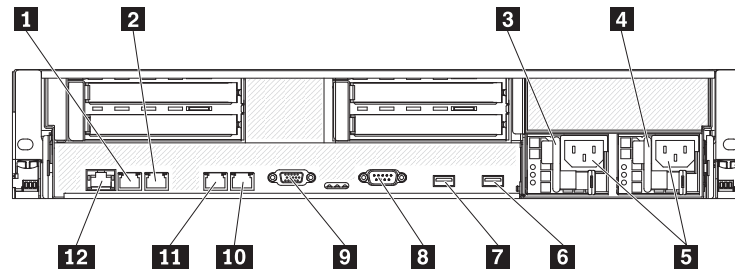
The following illustrations show the locations of the input and output connectors on the front and rear of the server.

Front view



- | | |
|--|-----------------|
| <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 15px; height: 15px; text-align: center; line-height: 15px;">1</div> | Video connector |
| <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 15px; height: 15px; text-align: center; line-height: 15px;">2</div> | USB 1 connector |
| <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 15px; height: 15px; text-align: center; line-height: 15px;">3</div> | USB 2 connector |

Rear view



- | | | | |
|----------|-----------------------|-----------|-------------------------------|
| 1 | Ethernet 3 (optional) | 7 | USB 3 |
| 2 | Ethernet 4 (optional) | 8 | Serial |
| 3 | Power supply 1 | 9 | Video |
| 4 | Power supply 2 | 10 | Ethernet 2 |
| 5 | Power cord connectors | 11 | Ethernet 1 |
| 6 | USB 4 | 12 | Systems-management (Ethernet) |

You must turn off the server before you connect or disconnect cables from the server. **Exception:** in order to view the error LEDs inside the server, you must leave the power cables connected to the power supplies.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Cable identifiers are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.

If the server comes with an installed operating system, see the documentation that comes with the operating system for additional cabling instructions.

Updating the server configuration

When you start the server for the first time after you add or remove an internal device, external SAS device, or USB keyboard or mouse, you might receive a message that the configuration has changed. The Server Configuration and Boot Management program starts automatically so that you can save the new configuration settings.

Some optional devices have device drivers that you must install. See the documentation that comes with each optional device for information about installing device drivers.

Chapter 7. Parts listing, ThinkServer RD220 Type 3729, 3779, 3797, and 3798

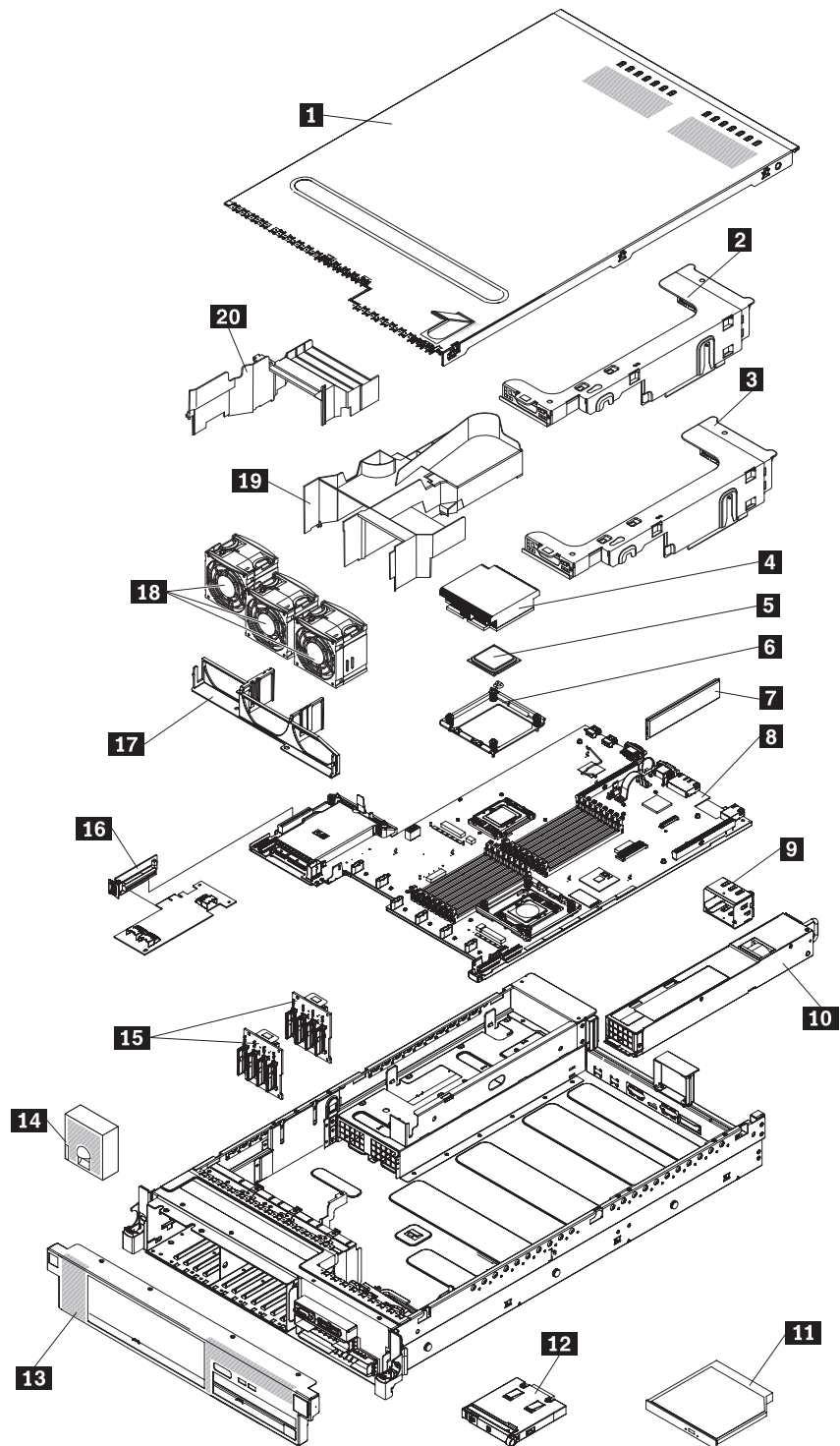
The following replaceable components are available for the ThinkServer RD220 Type 3729, 3779, 3797, and 3798 server, except as specified otherwise in "Replaceable server components." To check for an updated parts listing on the Web, go to:
<http://www.lenovo.com/support> for the information.

Replaceable server components

The four types of replaceable components are:

- **Consumables:** Purchase and replacement of consumables (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If Lenovo acquires or installs a consumable component at your request, you will be charged for the service.
- **Self-service CRUs:** these CRUs unplug or are secured by no more than two screws. Examples of these types of CRUs include a USB device or the power cord. Other Self-service CRUs depending on product design might include hot-swap hard disk drives, hot-swap fans, hot-swap power supplies, memory DIMMs, and RAID cards.
- **Optional-service CRUs:** these CRUs are isolated parts within the server and are concealed by an access panel that is typically secured by more than two screws. Once the access panel is removed, the specific CRU is visible. One example of an option-service CRU is the DASD backplane.
- Both types of CRUs are listed in the table on the following page.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.



The following table lists the part numbers for the server components.

Table 13. View 1 CRUs and FRUs, Type 3729

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover (models CTO All Models)	49Y5363		
2	PCI Express riser card assembly (1 x 16) (models CTO)	43V7064		
3	PCI Express riser card assembly (2 x 8) (models CTO)	43V7063		
4	Heat sink (models CTO All Models)	49Y4820		
5	Microprocessor - 2.93 GHz 95 W (models CTO)			46D1262
5	Microprocessor - 2.80 GHz 95 W (models CTO)			46D1263
5	Microprocessor - 2.67 GHz 95 W (models CTO)			46D1264
5	Microprocessor - 2.53 GHz 80 W (models CTO)			46D1265
5	Microprocessor - 2.40 GHz 80 W (models CTO)			46D1266
5	Microprocessor - 2.26 GHz 80 W (models CTO)			46D1267
5	Microprocessor - 2.13 GHz 60 W (models CTO)			46D1268
5	Microprocessor - 2.26 GHz 60 W (models CTO)			46D1269
5	Microprocessor - 2.13 GHz 80 W (models CTO)			46D1270
5	Microprocesso10r - 2.00 GHz 80 W (models CTO)			46D1271
5	Microprocessor - Dual Core Intel Xeon E5502 (1.86GHz 4MB L2 Cache 800MHz FSB 80w) (models CTO 18U 18S 18Y 18G 18M 18A 18Q 18T 18H 18R 18E 19U 19S 19Y 19G 19M 19A 19Q 19T 19H 19R 19E)			46D1272
6	Microprocessor retention module (models CTO All Models)	49Y4822		
7	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO 18U 18S 18Y 18G 18M 18Q 18T 18H 18R 18E 19U 19S 19Y 19G 19M 19A 19Q 19T 19H 19R 19E)	46U1991		
7	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
7	Memory, 2GB DDR3-1333 1Rx4 LP RDIMM (models CTO)	46U1993		
7	Memory, 4GB DDR3-1333 2Rx4 LP RDIMM (models CTO)	46U1994		
8	System board (models CTO 18U 18S 18Y 18G 18M 18E 19U 19S 19Y 19G 19M 19A 19Q 19T 19H 19R 19E)			43V7072
10	Power supply, 675 W (models CTO All Models)	39Y7201		
11	DVD drive (models CTO)	44W3254		
12	Operator information panel (models CTO All Models)	46U2140		
14	2.5 inch hot-swap hard disk drive filler panel (models CTO All Models)	49Y5359		
15	SAS 4—hard disk drive backplane (models CTO)		43V7070	
16	Riser Card (models CTO)	43V7065		
17	Fan cage (models CTO All Models)	49Y5362		
18	Fans (models CTO All Models)	49Y5361		
19	DIMM air baffle (models CTO All Models)	49Y5357		
	Virtual Media Key (models CTO All Models)	42D0545		
	Ethernet card (models CTO)	43V7073		

Table 13. View 1 CRUs and FRUs, Type 3729 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	Multiburn (models CTO)	44W3256		
	Hard disk drive, 300Gb 2.5" SFF (models CTO All Models)	46U1988		
	Hard disk drive, 146GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2117		
	Hard disk drive, 146GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2120		
	Hard disk drive, 300GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2124		
	Hard disk drive, 73GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2128		
	Hard disk drive, 500GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2759		
	Hard disk drive, 160GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2760		
	SAS/SATA backplane (models CTO)		43V7070	
	SAS Raid Connector (models CTO)	44E8796		
	Microprocessor air baffle (included in air baffle kit)	N/A		
	ServerRAID battery (models CTO All Models)	43W4342		
	Remote RAID battery tray (models CTO All Models)	49Y5355		
	Chassis assembly (models CTO All Models)	49Y5368		
	Cable assembly, simple swap (models CTO All Models)	49Y5354		
	Cable management arm (models CTO All Models)	49Y4817		
	HBA SAS adapter (models CTO all Models)	44E8701		
	Integrated Management Module (IMM) Premium HW Key (models CTO)		46C7528	
	RISER Kimmi adapter (models CTO)	43V7067		
	LSI MR10M SAS/SATA controller (models CTO)	43W4341		
	MR-10is SAS/SATA controller (models CTO all Models)	44E8696		
	LSI MR-10i battery (models CTO all Models)	43W4301		
	NetXtreme 1000 Express G Ethernet adapter (models CTO all Models)	39Y6100		
	NetXtreme II 1000 Express Ethernet adapter (models CTO all Models)	39Y6070		
	BR-10i SATA/SAS controller (models CTO 18U 18S 18Y 18G 18M 18E 19U 19S 19Y 19G 19M 19A 19Q 19T 19H 19R 19E)	44E8690		
	MR-10i SATA/SAS Controller (models CTO)	43W4297		
	Op Panel adapter (models CTO)	44E4372		
	Cable, power (4 hard disk drives) (models CTO All Models)	46M6441		
	Cable, power (8 hard disk drives) (models CTO All Models)	46M6443		

Table 13. View 1 CRUs and FRUs, Type 3729 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	Cable, operator information panel (models CTO All Models)	46C4139		
	Cable, SAS signal (165 mm) (models CTO All models)	46M6439		
	Cable, SAS signal (200 mm) (models CTO All models)	46M6437		
	Cable, USB/video (models CTO All Models)	46C4146		
	Bling Bling Ops Diag Panel (models CTO All models)	46M3560		

Table 14. View 1 CRUs and FRUs, Type 3779

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover (models CTO All Models)	49Y5363		
2	PCI Express riser card assembly (1 x 16) (models CTO)	43V7064		
3	PCI Express riser card assembly (2 x 8) (models CTO)	43V7063		
4	Heat sink (models CTO All Models)	49Y4820		
5	Microprocessor - 2.93 GHz 95 W (models CTO)			46D1262
5	Microprocessor - 2.80 GHz 95 W (models CTO)			46D1263
5	Microprocessor - 2.67 GHz 95 W (models CTO)			46D1264
5	Microprocessor - 2.53 GHz 80 W (models CTO)			46D1265
5	Microprocessor - 2.40 GHz 80 W (models CTO)			46D1266
5	Microprocessor - 2.26 GHz 80 W (models CTO)			46D1267
5	Microprocessor - 2.13 GHz 60 W (models CTO)			46D1268
5	Microprocessor - 2.26 GHz 60 W (models CTO)			46D1269
5	Microprocessor - 2.13 GHz 80 W (models CTO)			46D1270
5	Microprocessor - 2.00 GHz 80 W (models CTO)			46D1271
5	Microprocessor - Dual-Core Intel Xeon E5502 (1.86GHz 4MB L2 Cache 800MHz FSB 80w) (models CTO 1AU 1AS 1AY 1AG 1AM 1AE)			46D1272
6	Microprocessor retention module (models CTO All Models)	49Y4822		
7	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO 1AU 1AS 1AY 1AG 1AM 1AE)	46U1991		
7	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
7	Memory, 2GB DDR3-1333 1Rx4 LP RDIMM (models CTO)	46U1993		
7	Memory, 4GB DDR3-1333 2Rx4 LP RDIMM (models CTO)	46U1994		
8	System board (models CTO 1AU 1AS 1AY 1AG 1AM 1AE)			43V7072
10	Power supply, 675 W (models CTO All Models)	39Y7201		
11	DVD drive (models CTO)	44W3254		
12	Operator information panel (models CTO All Models)	46U2140		

Table 14. View 1 CRUs and FRUs, Type 3779 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
14	2.5 inch hot-swap hard disk drive filler panel (models CTO All Models)	49Y5359		
15	Riser Card (models CTO)	43V7065		
16	SAS 4-hard disk drive backplane (models CTO)		43V7070	
17	Fan cage (models CTO All Models)	49Y5362		
18	Fans (models CTO All Models)	49Y5361		
19	DIMM air baffle (models CTO All Models)	49Y5357		
	Virtual Media Key (models CTO All Models)	42D0545		
	Ethernet card (models CTO)	43V7073		
	Multiburn (models CTO)	44W3256		
	Hard disk drive, 300Gb 2.5" SFF (models CTO All Models)	46U1988		
	Hard disk drive, 146GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2117		
	Hard disk drive, 146GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2120		
	Hard disk drive, 300GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2124		
	Hard disk drive, 73GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2128		
	Hard disk drive, 500GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2759		
	Hard disk drive, 160GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2760		
	SAS/SATA backplane (models CTO)		43V7070	
	SAS Raid Connector (models CTO)	44E8796		
	Microprocessor air baffle (included in air baffle kit)	N/A		
	ServerRAID battery (models CTO All Models)	43W4342		
	Remote RAID battery tray (models CTO All Models)	49Y5355		
	HBA SAS adapter (models CTO all Models)	44E8701		
	Integrated Management Module (IMM) Premium HW Key (models CTO)		46C7528	
	RISER Kimmi adapter (models CTO)	43V7067		
	LSI MR10M SAS/SATA controller (models CTO)	43W4341		
	MR-10is SAS/SATA Controller (models CTO all Models)	44E8696		
	LSI MR-10i battery (models CTO all Models)	43W4301		
	NetXtreme 1000 Express G Ethernet adapter (models CTO all Models)	39Y6100		
	NetXtreme II 1000 Express Ethernet adapter (models CTO all Models)	39Y6070		
	BR-10i SATA/SAS controller (models CTO 1AU 1AS 1AY 1AG 1AM 1AE)	44E8690		

Table 14. View 1 CRUs and FRUs, Type 3779 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	MR-10i SATA/SAS controller (models CTO)	43W4297		
	Op Panel adapter (models CTO)	44E4372		
	CARRIER/DAUGHT adapter (models CTO)	44E8763		
	Chassis assembly (models CTO All Models)	49Y5368		
	Cable assembly, simple swap (models CTO All Models)	49Y5354		
	Cable management arm (models CTO All Models)	49Y4817		
	Cable, power (4 hard disk drives) (models CTO All Models)	46M6441		
	Cable, power (8 hard disk drives) (models CTO All Models)	46M6443		
	Cable, operator information panel (models CTO All Models)	46C4139		
	Cable, SAS signal (165 mm) (models CTO All models)	46M6439		
	Cable, SAS signal (200 mm) (models CTO All models)	46M6437		
	Cable, USB/video (models CTO All Models)	46C4146		
	Bling Bling Ops Diag Panel (models CTO All models)	46M3560		

Table 15. View 1 CRUs and FRUs, Type 3797

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover (models CTO)	49Y5363		
2	PCI Express riser card assembly (1 x 16) (models CTO)	43V7064		
3	PCI Express riser card assembly (2 x 8) (models CTO)	43V7063		
4	Heat sink (models CTO)	49Y4820		
5	Microprocessor - 2.93 GHz 95 W (models CTO)			46D1262
5	Microprocessor - 2.80 GHz 95 W (models CTO)			46D1263
5	Microprocessor - 2.67 GHz 95 W (models CTO)			46D1264
5	Microprocessor - 2.53 GHz 80 W (models CTO)			46D1265
5	Microprocessor - 2.40 GHz 80 W (models CTO)			46D1266
5	Microprocessor - 2.26 GHz 80 W (models CTO)			46D1267
5	Microprocessor - 2.13 GHz 60 W (models CTO)			46D1268
5	Microprocessor - 2.26 GHz 60 W (models CTO)			46D1269
5	Microprocessor - 2.13 GHz 80 W (models CTO)			46D1270
5	Microprocessor - 2.00 GHz 80 W (models CTO)			46D1271
5	Microprocessor - 1.86 GHz 80 W (models CTO)			46D1272
6	Microprocessor retention module (models CTO)	49Y4822		
7	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
7	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		

Table 15. View 1 CRUs and FRUs, Type 3797 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
7	Memory, 2GB DDR3-1333 1Rx4 LP RDIMM (models CTO)	46U1993		
7	Memory, 4GB DDR3-1333 2Rx4 LP RDIMM (models CTO)	46U1994		
8	System board (models CTO)			43V7072
10	Power supply, 675 W (models CTO)	39Y7201		
11	DVD drive (models CTO)	44W3254		
12	Operator information panel (models CTO All Models)	46U2140		
14	2.5 inch hot-swap hard disk drive filler panel (models CTO)	49Y5359		
15	SAS 4-hard disk drive backplane (models CTO)		43V7070	
16	Riser Card (models CTO)	43V7065		
17	Fan cage (models CTO)	49Y5362		
18	Fans (models CTO)	49Y5361		
19	DIMM air baffle (models CTO)	49Y5357		
	Power supply bay filler (models CTO)	49Y4821		
	Virtual Media Key (models CTO)	42D0545		
	Ethernet card (models CTO)	43V7073		
	Multiburn (models CTO)	44W3256		
	Hard disk drive, 300Gb 2.5" SFF (models CTO)	46U1988		
	Hard disk drive, 146GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2117		
	Hard disk drive, 146GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2120		
	Hard disk drive, 300GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2124		
	Hard disk drive, 73GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2128		
	Hard disk drive, 500GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2759		
	Hard disk drive, 160GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2760		
	SAS/SATA backplane (models CTO)		43V7070	
	SAS Raid Connector (models CTO)	44E8796		
	Microprocessor air baffle (included in air baffle kit)	N/A		
	ServeRAID battery (models CTO)	43W4342		
	HBA SAS adapter (models CTO all Models)	44E8701		
	Integrated Management Module (IMM) Premium HW key (models CTO)		46C7528	
	RISER Kimmi adapter (models CTO)	43V7067		
	LSI MR10M SAS/SATA controller (models CTO)	43W4341		

Table 15. View 1 CRUs and FRUs, Type 3797 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	MR-10is SAS/SATA controller (models CTO all Models)	44E8696		
	LSI MR-10i battery (models CTO all Models)	43W4301		
	NetXtreme 1000 Express G Ethernet adapter (CTO all Models)	39Y6100		
	NetXtreme II 1000 Express Ethernet adapter (CTO all Models)	39Y6070		
	BR-10i SATA/SAS controller (models CTO)	44E8690		
	CARRIER/DAUGHT adapter (models CTO)	44E8763		
	MR-10i SATA/SAS controller (models CTO)	43W4297		
	Op Panel adapter (models CTO)	44E4372		
	Remote RAID battery tray (models CTO)	49Y5355		
	Chassis assembly (models CTO)	49Y5368		
	Cable assembly, simple swap (models CTO)	49Y5354		
	Cable management arm (models CTO)	49Y4817		
	Cable, power (4 hard disk drives) (models CTO)	46M6441		
	Cable, power (8 hard disk drives) (models CTO)	46M6443		
	Cable, operator information panel (models CTO)	46C4139		
	Cable, SAS signal (165 mm) (models CTO)	46M6439		
	Cable, SAS signal (200 mm) (models CTO)	46M6437		
	Cable, USB/video (models CTO)	46C4146		
	Bling Bling Ops Diag Panel (models CTO)	46M3560		

Table 16. View 1 CRUs and FRUs, Type 3798

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Cover (models CTO All Models)	49Y5363		
2	PCI Express riser card assembly (1 x 16) (models CTO All Models)	43V7064		
3	PCI Express riser card assembly (2 x 8) (models CTO All Models)	43V7063		
4	Heat sink (models CTO All Models)	49Y4820		
5	Microprocessor - 2.93 GHz 95 W (models CTO)			46D1262
5	Microprocessor - 2.80 GHz 95 W (models CTO)			46D1263
5	Microprocessor - 2.67 GHz 95 W (models CTO)			46D1264
5	Microprocessor - Quad-Core Intel Xeon E5540 (2.53GHz 8MB L2 Cache 1066MHz FSB 80w) (models CTO 1JG 1JM 1JV 1JE 1LU 1LS 1LY 1LG 1LM 1LV 1LE)			46D1265
5	Microprocessor - 2.40 GHz 80 W (models CTO)			46D1266

Table 16. View 1 CRUs and FRUs, Type 3798 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
5	Microprocessor - Quad-Core Intel Xeon E5520 (2.26GHz 8MB L2 Cache 1066MHz FSB 80w) (models CTO 15G 15M 15V 15E 1DG 1DM 1DV 1DE 1EG 1EM 1EV 1EE 1FU 1FS 1FY 1FG 1FM 1FV 1FE 1HG 1HM 1HV 1HE)			46D1267
5	Microprocessor - 2.13 GHz 60 W (models CTO 13U 13S 13Y 13G 13M 13A 13Q 13T 13H 13V 13R 13E 14U 14S 14Y 14G 14M 14A 14Q 14T 14H 14V 14R 14E 17U 17S 17Y 17G 17M 17A 17Q 17T 17H 17V 17R 17E)			46D1268
5	Microprocessor - Quad-Core Intel Xeon L5520 (2.26GHz 8MB L2 Cache 1066MHz FSB LV 60w) (models CTO 15G 15M 15V 15E 1DG 1DM 1DV 1DE 1EG 1EM 1EV 1EE 1FU 1FS 1FY 1FG 1FM 1FV 1FE 1DG 1DM 1DV 1DE)			46D1269
5	Microprocessor - Quad-Core Intel Xeon E5506 (2.13GHz 4MB L2 Cache 800MHz FSB 80w) (models CTO 13U 13S 13Y 13G 13M 13V 13E 14G 14M 14V 14E 17G 17M 17V 17E)			46D1270
5	Microprocessor - 2.00 GHz 80 W (models CTO)			46D1271
5	Microprocessor - Dual-Core Intel Xeon E5502 (1.86GHz 4MB L2 Cache 800MHz FSB 80w) (models CTO 11G 11M 11V 11E 16U 16S 16Y 16G 16M 16V 16E)			46D1272
6	Microprocessor retention module (models CTO All Models)	49Y4822		
7	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
7	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
7	Memory, 2GB DDR3-1333 1Rx4 LP RDIMM (models CTO 11G 11M 11V 11E 12U 12S 12Y 12G 12M 12V 12E 13U 13S 13Y 13G 13M 13V 13E 14G 14M 14V 14E 15G 15M 15V 15E 16U 16S 16Y 16G 16M 16V 16E 17G 17M 17V 17E 1DG 1DM 1DV 1DE 1EG 1EM 1EV 1EE 1HG 1HM 1HV 1HE 1JG 1JM 1JV 1JE 1LU 1LS 1LY 1LG 1LM 1LV 1LE)	46U1993		
7	Memory, 4GB DDR3-1333 2Rx4 LP RDIMM (models CTO)	46U1994		
8	System board (models CTO 11G 11M 11V 11E 13U 13S 13Y 13G 13M 13V 13E 14G 14M 14V 14E 15G 15M 15V 15E 16U 16S 16Y 16G 16M 16V 16E 17G 17M 17V 17E 1DG 1DM 1DV 1DE 1EG 1EM 1EV 1EE 1FU 1FS 1FY 1FG 1FM 1FV 1FE 1HG 1HM 1HV 1HE 1JG 1JM 1JV 1JE 1LU 1LS 1LY 1LG 1LM 1LV 1LE)			43V7072
10	Power supply, 675 W (models CTO All Models)	39Y7201		
11	DVD drive (models CTO)	44W3254		

Table 16. View 1 CRUs and FRUs, Type 3798 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
11	DVD drive, Ultrastim Enhanced SATA Multi-Burner (Rambo) (models CTO 11G 11M 11A 11Q 11T 11H 11V 11R 11E 12U 12S 12Y 12G 12M 12A 12Q 12T 12H 12V 12R 12E 13U 13S 13Y 13G 13M 13A 13Q 13T 13H 13V 13R 13E 14U 14S 14Y 14G 14M 14A 14Q 14T 14H 14V 14R 14E 15U 15S 15Y 15G 15M 15A 15Q 15T 15H 15V 15R 15E 16U 16S 16Y 16G 16M 16A 16Q 16T 16H 16V 16R 16E 17U 17S 17Y 17G 17M 17A 17Q 17T 17H 17V 17R 17E 1DG 1DM 1DA 1DQ 1DT 1DH 1DV 1DR 1DE 1EG 1EM 1EA 1EQ 1ET 1EH 1EV 1ER 1EE 1FU 1FS 1FY 1FG 1FM 1FA 1FQ 1FT 1FH 1FV 1FR 1FE 1HG 1HM 1HA 1HQ 1HT 1HH 1HV 1HR 1HE 1JG 1JM 1JA 1JQ 1JT 1JH 1JV 1JR 1JE 1LU 1LS 1LY 1LG 1LM 1LA 1LQ 1LT 1LH 1LV 1LR 1LE)	44W3256		
12	Operator information panel (models CTO All Models)	46U2140		
14	2.5 inch hot-swap hard disk drive filler panel (models CTO All Models)	49Y5359		
15	SAS 4-hard disk drive backplane (models CTO All Models)		43V7070	
16	Riser Card (models CTO All Models)	43V7065		
17	Fan cage (models CTO All Models)	49Y5362		
18	Fans (models CTO All Models)	49Y5361		
19	DIMM air baffle (models CTO All Models)	49Y5357		
	Power supply bay filler (models CTO All Models)	49Y4821		
	Virtual Media Key (models CTO All Models)	42D0545		
	Ethernet card (models CTO All Models)	43V7073		
	Hard disk drive, 300Gb 2.5" SFF (models CTO All Models)	46U1988		
	Hard disk drive, 146GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2117		
	Hard disk drive, 146GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2120		
	Hard disk drive, 300GB 10K SFF 6Gbps HS HDD (models CTO All Models)	46U2124		
	Hard disk drive, 73GB 15K SFF 6Gbps HS HDD (models CTO All Models)	46U2128		
	Hard disk drive, 500GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2759		
	Hard disk drive, 160GB 2.5" 7200rpm 3GB/s Hot-Swap SATA (models CTO All Models)	46U2760		
	SAS/SATA backplane (models CTO All Models)	43V7070		
	SAS Raid Connector (models CTO All Models)	44E8796		
	Microprocessor air baffle (included in air baffle kit)	N/A		
	Cosmetic 8 drive + tape bezel (models CTO 11G 11M 11V 11E 13U 13S 13Y 13G 13M 13V 13E 1EG 1EM 1EV 1EE)	46U1989		

Table 16. View 1 CRUs and FRUs, Type 3798 (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
	COSMETIC 12DR (models CTO 14G 14M 14V 14E 15G 15M 15V 15E 16U 16S 16Y 16G 16M 16V 16E 17G 17M 17V 17E 1DG 1DM 1DV 1DE 1FU 1FS 1FY 1FG 1FM 1FV 1FE 1HG 1HM 1HV 1HE 1JG 1JM 1JV 1JE 1LU 1LS 1LY 1LG 1LM 1LV1LE)	46U1990		
	Slide kit (models CTO All Models)	49Y4816		
	HBA SAS adapter (models CTO all Models)	44E8701		
	Integrated Management Module (IMM) Premium HW Key (models CTO all Models)		46C7528	
	RISER Kimmi adapter (models CTO all Models)	43V7067		
	LSI MR10M SAS/SATA controller (models CTO)	43W4341		
	MR-10is SAS/SATA controller (models CTO all Models)	44E8696		
	LSI MR-10i battery (models CTO all Models)	43W4301		
	NetXtreme 1000 Express G Ethernet adapter (models CTO all Models)	39Y6100		
	NetXtreme II 1000 Express Ethernet adapter (models CTO all Models)	39Y6070		
	BR-10i SATA/SAS controller (models CTO All Models)	44E8690		
	CARRIER/DAUGHT adapter (models CTO All Models)	44E8763		
	MR-10i SATA/SAS controller (models CTO All Models)	43W4297		
	Op Panel adapter (models CTO All Models)	44E4372		
	ServeRAID battery (models CTO All Models)	43W4342		
	Remote RAID battery tray (models CTO All Models)	49Y5355		
	Chassis assembly (models CTO All Models)	49Y5368		
	Cable assembly, simple swap (models CTO All Models)	49Y5354		
	Cable management arm (models CTO All Models)	49Y4817		
	Cable, power (4 hard disk drives) (models CTO All Models)	46M6441		
	Cable, power (8 hard disk drives) (models CTO All Models)	46M6443		
	Cable, operator information panel (models CTO All Models)	46C4139		
	Cable, SAS signal (165 mm) (models CTO All Models)	46M6439		
	Cable, SAS signal (200 mm) (models CTO All Models)	46M6437		
	Cable, USB/video (models CTO All Models)	46C4146		
	Bling Bling Ops Diag Panel (models CTO All Models)	46M3560		

Consumable parts

The following consumable parts are available for purchase from the retail store.

Table 17. Consumable parts, Type 3729

Index	Description	Part number
	Battery, 3.0 volt	33F8354
	ServeRAID-MR10i battery	43W4301

Table 18. Consumable parts, Type 3779

Index	Description	Part number
	Battery, 3.0 volt	33F8354
	ServeRAID-MR10i battery	43W4301

Table 19. Consumable parts, Type 3797

Index	Description	Part number
	Battery, 3.0 volt	33F8354
	ServeRAID-MR10i battery	43W4301

Table 20. Consumable parts, Type 3798

Index	Description	Part number
	Battery, 3.0 volt	33F8354
	ServeRAID-MR10i battery	43W4301

To order a consumable part, go to:

<http://www.lenovo.com/support> for the information.

If you need help with your order, call the toll-free number that is listed on the retail parts page, or contact your local Lenovo representative for assistance.

Power cords

For your safety, Lenovo provides a power cord with a grounded attachment plug to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

Lenovo power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S.): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

Power cords for a specific country or region are usually available only in that country or region.

Table 21. View 1 CRUs and FRUs, Type 3729

Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 18Y 19Y)
39M5081	US/Canada 2.8M (models CTO 18U 18S 18V 19U 19S 19V)
39M5199	Japan 2.8M (models CTO 18E 19E)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 18Y 18G 19Y 19G)
39M5102	ANZ 2.8M (models CTO 18M 19M)
39M5130	Denmark 2.8M (models CTO 18G 189G)
39M5144	S. Africa 2.8M (models CTO 18G 18M 19G 19M)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO 18S 18G 19S 19G)
39M5172	Israel 2.8M (models CTO 18G 19G)
39M5179	Europe 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 22. View 1 CRUs and FRUs, Type 3779

Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 1AY)
39M5081	US/Canada 2.8M (models CTO 1AU 1AS 1AV)
39M5199	Japan 2.8M (models CTO 1AE)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 1AY 1AG)
39M5102	ANZ 2.8M (models CTO 1AM)
39M5130	Denmark 2.8M (models CTO 1AG)
39M5144	S. Africa 2.8M (models CTO 1AG 1AM)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO 1AS 1AG)
39M5172	Israel 2.8M (models CTO 1AG)
39M5179	Europe 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 23. View 1 CRUs and FRUs, Type 3797

Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO)
39M5081	US/Canada 2.8M (models CTO)
39M5199	Japan 2.8M (models CTO)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO)
39M5102	ANZ 2.8M (models CTO)
39M5130	Denmark 2.8M (models CTO)
39M5144	S. Africa 2.8M (models CTO)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO)
39M5172	Israel 2.8M (models CTO)
39M5179	Europe 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 24. View 1 CRUs and FRUs, Type 3798

Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 13Y 16Y 17Y 1FY 1HY 1JY 1LY)
39M5081	US/Canada 2.8M (models CTO 11V 13U 13S 13V 14V 15V 16U 16S 16V 17V 1DV 1EV 1FU 1FS 1FV 1HV 1JV 1LU 1LS 1LV)
39M5199	Japan 2.8M (models CTO 11E 13E 14E 15E 16E 17E 1DE 1EE 1FE 1HE 1JE 1LE)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11G 13Y 13G 14Y 14G 15Y 15G 16Y 16G 17Y 17G 1DG 1EG 1FY 1FG 1HG 1JG 1LY 1LG)
39M5102	ANZ 2.8M (models CTO 11M 13M 14M 15M 16M 17M 1DM 1EM 1FM 1HM 1JM 1LM)
39M5130	Denmark 2.8M (models CTO 11G 13G 14G 15G 16G 17G 1DG 1EG 1FG 1HG 1JG 1LG)
39M5144	S. Africa 2.8M (models CTO 11G 11M 13G 13M 14G 14M 15G 15M 16G 16M 17G 17M 1DG 1DM 1EG 1EM 1FG 1FM 1HG 1HM 1JG 1LG 1LM)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO 11G 13S 13G 14S 14G 15S 15G 16S 16G 17S 17G 1DG 1EG 1FS 1FG 1HG 1JG 1LS 1LG)
39M5172	Israel 2.8M (models CTO 11G 12G 13G 14G 15G 16G 17G 1DG 1EG 1FG 1HG 1JG 1LG)
39M5179	Europe 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

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When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

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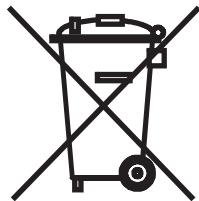
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Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to <http://www.lenovo.com/lenovo/environment> or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.



For the European Union:

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to <http://www.lenovo.com/lenovo/environment>.

For California:

Perchlorate material - special handling may apply. See <http://www.dtsc.ca.gov/hazardouswaste/perchlorate/>.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Electronic emissions notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

German Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Japanese recycling statements

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機が使用済みとなり廃棄される場合は、廃棄物処理法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細については、以下のURL にアクセスしてください。

<http://www.ibm.com/jp/pc/service/recycle/pcrecycle>

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003年10月1日よりスタートしました。詳細については、以下のURL にアクセスしてください。

<http://www.ibm.com/jp/pc/service/recycle/personal>

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など)が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

声 明

此为 A 级产品，在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Korean Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
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Part Number: 40M2493

Printed in USA

(1P) P/N: 40M2493

